Literature Review of Psychological and Social-Psychological Factors Implicated in Medically Unexplained Physical Symptoms

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Abstract

The present project reviews the literature regarding psychological and social-psychological factors that have been previously identified in the medical and psychological literature as related and/or implicated with medically unexplainable physical symptoms (MUPS). Based on this review, suitable measurement tools are identified to assist in the development of a longitudinal database to be developed by the Directorate of Medical Policy Prospective Health Data Analysis Capability Study (PHDACS). The initial step involved identification of the main psychological and social-psychological factors that have been associated with MUPS among military personnel. The second step required the identification of various instruments that potentially could be used for the PHDACS. The findings were that the most frequently reported key factors that appear to be associated with reporting of physical symptoms in the military context are posttraumatic stress disorder and exposure to psychological stressors, depression, anxiety, and somatization. Instrument selection was based on the following assumptions: the focus should be on self-report measures; the measures proposed have solid psychometric/diagnostic properties; the measures be relevant/sensitive to the military context; and, there should be considerations made with regards to response burden and cost. The measures recommended were the Primary Care Evaluation of Mental Disorders – Patient Health Questionnaire (Spitzer, Kroenke, & Williams, 1999) to assess depression, anxiety and somatization; Mississippi Scale for Combat Related Posttraumatic Stress Disorder (Disorder (Keane, Cadell, & Taylor, 1988) to assess PTSD, the Combat Exposure Scale (Keane, Fairbank, Caddell & Zimering, 1989) and the United States military's Comprehensive Clinical Evaluation Program items designed to specifically assess psychological exposures to stress.

Résumé

Le présent projet consiste à effectuer une analyse documentaire des facteurs psychologiques et sociopsychologiques déjà répertoriés dans la littérature médicale et psychologique et ayant un lien avec les symptômes physiques médicalement inexpliqués (SPMI). À partir de cette analyse, on recensera des outils d'évaluation appropriés qui permettront à l'Étude prospective de la capacité d'analyse des données sur la santé (EPCADS) de la Direction – Politiques médicales d'élaborer une base de données longitudinales. La première étape consistait à relever les principaux facteurs psychologiques et sociopsychologiques associés aux SPMI chez le personnel militaire. La deuxième étape avait pour but de recenser les divers instruments qui pourraient être utilisés dans le cadre de l'EPCADS. Selon les résultats obtenus, les facteurs clés les plus fréquemment déclarés qui semblent être associés à la déclaration des symptômes physiques dans le contexte militaire sont l'état de stress post-traumatique (ESPT) et l'exposition à des agents stressants psychologiques, la dépression, l'anxiété et la somatisation. Le choix des instruments s'est fondé sur les hypothèses suivantes : l'accent doit être mis sur les mesures de l'autodéclaration; les mesures proposées ont des caractéristiques psychométriques/diagnostiques solides; les mesures doivent être pertinentes/adaptées au contexte militaire; le fardeau de réponse et le coût de la réponse doivent être pris en considération. Les mesures recommandées étaient les suivantes : le Primary Care Evaluation of Mental Disorders – Patient Health Questionnaire (Spitzer, Kroenke et Williams, 1999) servant à évaluer la dépression, l'anxiété et la somatisation; la Mississippi Scale for Combat Related Posttraumatic Stress Disorder (Keane, Cadell et Taylor, 1988) servant à évaluer l'ESPT; la Combat Exposure Scale (Keane, Fairbank, Caddell et Zimering, 1989) et les questions du Comprehensive Clinical Evaluation Program des militaires des États-Unis, conçues pour évaluer précisément l'exposition psychologique au stress.

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Executive summary

Background: The purpose of the present project is to identify suitable measurement tools for psychological and social-psychological factors that have been previously identified in the medical and psychological literature as related and/or implicated with medically unexplainable physical symptoms (MUPS). Identification of these tools will assist in the work currently being developed by the Directorate of Medical Policy in its efforts to conduct a Prospective Health Data Analysis Capability Study (PHDACS).
This report contains the findings from the literature review and identification of suitable measures. The first step was to identify the main psychological and social-psychological factors that have been associated with MUPS among military personnel. The second step involved the identification of the various instruments that potentially could be used for the PHDACS.

The scope of the literature review was characterized by the following parameters:

- The literature review should focus primarily on both medical and psychological literature from academic peer-reviewed journals;
- Some considerations could be made for appropriate "grey" literature if the report findings are deemed to be scientifically rigorous and relevant;
- The time period covered was approximately the past ten years;
- The focus should remain on psychological and social-psychological factors related to MUPS and not on physiological etiology of MUPS; and,
- The review of literature should primarily be restricted to the military context, and then, if necessary, be broadened to include studies of sub-populations outside of the military context.

Challenges in Applying Findings from the Literature

The literature review identified some challenges to consider when determining to what extent it is possible to identify psychological and social-psychological factors related to MUPS from the current literature.

- *Defining medically unexplained physical symptoms* - There appears to be two main approaches to understanding or defining the "unexplainable" aspect of physical symptoms. The approach used in the majority of studies reviewed is to emphasize that the etiology of the symptom and/or condition is unknown. The alternative approach emphasizes a set of physical symptoms that do not define a known condition.
- *Military populations studied* - Almost all recent studies regarding MUPS in military populations have focussed on US Gulf War Veterans (GWVs). Of the 22 studies identified as key studies, 20 involved studying US GWVs. In addition, over one-half of these studies have focused on US GWVs who have presented as part of the US military's Comprehensive Clinical Evaluation Program (CCEP) that provides a voluntary, clinical evaluation for GWVs with Gulf War health concerns. Due to the fact that much of the research was conducted using a specific military population with potentially unique exposures and experiences, some findings regarding psychological and social psychological factors may not be generalizable to CF personnel in various deployment situations.
- *Reliance on post-deployment measures* – Many of the studies were only able to administer measures and evaluations post-deployment, given that most studies of MUPS focused on GWVs after the possibility of increased health concerns had been raised for this group post-deployment. The nearly exclusive use of this methodological approach limits the extent to which these studies can identify the pre-existing factors that have an impact on health outcomes post-deployment.
- *Nature of the relationship studied* - The relationship between psychological and social-psychological factors with MUPS in the military context remains understudied. Approximately

one-half of the studies that were identified for review did not have the understanding of this relationship as their main focus. The group of studies that did not specifically report on the relationship or association often reported only the prevalence of specific symptoms within the population studied.

Results: Psychological and Social-Psychological Factors Identified

From a review of the key studies that have been conducted in the military context, the main factors identified were primarily psychological symptoms and disorders. This finding is concurrent with findings from civilian populations presenting in primary care with physical symptoms. The most frequently reported key factors that appear to be associated with reporting of physical symptoms in the military context are:

- **PTSD and Exposure to Psychological Stressors**

Over one-half of the studies reviewed (14 of 22) identified either PTSD, PTSD-symptoms, and/or exposure to high levels of psychological stressors as being associated with increased levels of reporting of physical symptoms. A number of reviewed studies included the *perceived* level of exposure to stress and the relationship it has with reporting physical symptoms.

- **Depression**

Most of the studies (19 out of 22 studies) reviewed examined depression and physical symptoms. Of these, the majority (12 out of 19 studies) examined the direct association of depression with the reporting of physical symptoms in the military context.

- **Anxiety**

One-half of the studies reviewed (11 out of 22 studies) specifically examined anxiety in the context of other physical or psychological symptoms. Of these, seven examined direct associations of anxiety with the reporting of physical symptoms within a military context.

- **Somatization**

Approximately one-quarter of the studies reviewed (5 out of 22 studies) specifically examined the relationship between somatization or somatoform disorders and the presence of physical symptoms.

Selection of Measures

In determining the suitability of instruments, the following assumptions were made:

- the focus should be on self-report measures;
- the measures proposed have solid psychometric/diagnostic properties;
- the measures be relevant/sensitive to the military context; and,
- there should be considerations made with regards to response burden and cost.

The following scales and measures were recommended to be considered for use in the PHDACS.

- *Primary Care Evaluation of Mental Disorders – Patient Health Questionnaire* (PRIME-MD-PHQ) (Spitzer, Kroenke, & Williams, 1999). This scale can be used to assess factors of depression, anxiety and somatization. The scale covers eight disorders (major depressive disorder; panic disorder; other anxiety disorder; bulimia nervosa; other depressive disorder; probable alcohol abuse or dependence; somatoform disorder; and, binge eating disorder). The scale possesses reasonable psychometric properties and has been used in much of the GWV work so there will be some comparability to previous and ongoing findings. Response burden would be kept to a minimum considering that it would cover three factors and it is estimated that it requires 15-25 minutes to complete depending on the number of symptoms. Cost is minimal, as permission has been granted from the scale authors for use of scale in PHDACS context.

- *Mississippi Scale for Combat-Related Posttraumatic Stress Disorder* (M-PTSD) (Keane, Cadell, & Taylor, 1988).The rationale for proposing this scale to assess PTSD is that it has reasonable psychometric properties, is one of the most commonly used instruments in research in the military context, and has a relatively low level of response burden with 35 to 39 items (depending on version) and takes approximately 15-20 minutes to complete. In addition, the cost of the scale would be minimal assuming permission to use the scale is granted.
- *Combat Exposure Scale* (CES) (Keane, Fairbank, Caddell & Zimering, 1989) This scale is designed to assess exposure to specific combat experiences. The scale posses reasonable psychometric properties, and is one of the most commonly used instruments in research in the military context. As well, it can be adapted to include items specific to certain deployments. The scale has a relatively low level of response burden with 40-50 items (depending on the version) requiring approximately 15-20 minutes to complete. Similar to the other scales, the cost would be minimal given that the scale is often made available to researchers at limited or no cost.
- *Additional CCEP Items Measuring Psychological Exposures to Stress* – In addition to the CES, it may be worthwhile to add some additional items of exposure to stress to ensure that this aspect is well covered. The unique CCEP stress items (those that do not overlap with the CES) combined with the CES would permit this thorough assessment with little additional cost and very little additional response burden, given that there is some duplication of items between the two measures.

The combination of these three scales along with unique items from the CCEP would provide an adequate measurement of all factors identified in the literature review. In addition, the response burden and cost of implementing these measures into the PHDACS would be significantly less than if other measures were to be implemented.

Significance: The aim of the PHDACS is to introduce a permanent mechanism that will provide the Canadian Forces (CF) with the possibility to analyse, on a permanent basis, prospective deployment health risk factors. A critical first step in this initiative is to correctly identify the key psychological and social psychological factors that may be implicated in MUPS and to select optimal measures for assessing these factors. Once implemented the PDHACS database will permit the Director General Health Services (DGHS) to analyse collected data on an ongoing basis, thereby providing the CF with the ability to identify health risk factors and initiate preventative risk management strategies.

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Sommaire

Contexte : Le présent projet a pour but de recenser des outils d'évaluation appropriés pour les facteurs psychologiques et sociopsychologiques qui, selon la littérature médicale et psychologique, ont un lien avec les symptômes physiques médicalement inexpliqués (SPMI). Le recensement de ces outils facilitera la tâche à la Direction – Politiques médicales qui a entrepris d'effectuer une Étude prospective de la capacité d'analyse des données sur la santé (EPCADS).
Ce rapport contient les résultats de l'analyse documentaire et du recensement des mesures appropriées. La première étape consistait à relever les principaux facteurs psychologiques et sociopsychologiques qui ont été associés aux SPMI chez le personnel militaire. La deuxième étape avait pour objectif de répertorier les divers instruments qui pourraient être utilisés pour l'EPCADS.

La portée de l'analyse documentaire reposait sur les paramètres suivants :

- l'analyse documentaire devrait être axée principalement sur la littérature médicale et psychologique constituée des revues universitaires dotées d'un comité de lecture;
- il faudrait tenir compte de la littérature « grise » appropriée dans la mesure où les conclusions des rapports sont jugées scientifiquement rigoureuses et pertinentes;
- la période étudiée s'étendait sur les dix dernières années environ;
- l'accent devrait être mis sur les facteurs psychologiques et sociopsychologiques liés aux SPMI et non à l'étiologie physiologique des SPMI; et
- l'analyse documentaire devrait être limitée principalement au contexte militaire, puis, au besoin, être élargie de manière à englober les études de sous-populations à l'extérieur du contexte militaire.

Difficultés liées à l'application des résultats des études examinées

L'analyse documentaire a mis en évidence certaines difficultés dont il faudra tenir compte lorsqu'on déterminera la mesure dans laquelle il est possible de recenser les facteurs psychologiques et sociopsychologiques liés aux SPMI à partir de la littérature actuelle.

- *Définition des symptômes physiques médicalement inexpliqués* – Deux démarches semblent avoir été utilisées en vue de comprendre ou de définir l'aspect « inexplicable » des symptômes physiques. La démarche adoptée dans la majorité des études examinées consiste à insister sur le fait que l'étiologie du symptôme et/ou de l'affection est inconnue. L'autre démarche fait ressortir une série de symptômes physiques qui ne correspondent à aucune affection connue.
- *Populations militaires étudiées* – Presque toutes les études récentes concernant les SPMI chez des militaires étaient centrées sur les anciens combattants américains de la guerre du Golfe; sur les 22 études répertoriées en tant qu'études clés, 20 portaient sur cette population. En outre, plus de la moitié de ces études avaient pour thème les anciens combattants de la guerre du Golf qui avaient participé au Comprehensive Clinical Evaluation Program (CCEP) des militaires des Etats-Unis; ce programme offre une évaluation clinique sur une base volontaire aux anciens combattants de cette guerre qui sont inquiets pour leur santé. Vu que la majeure partie de cette recherche a été menée sur une population militaire précise ayant subi des expositions et vécu des expériences probablement hors du commun, il est possible que certains résultats concernant les facteurs psychologiques et sociopsychologiques ne puissent être généralisés au personnel des FC en situations de déploiement variées.
- *Études fondées sur des mesures postdéploiement* – De nombreuses études se sont basées uniquement sur des mesures et des évaluations postdéploiement, vu que la plupart des études sur les SPMI étaient axées sur les anciens combattants de la guerre du Golfe après qu'on ait soulevé la

possibilité que ce groupe en postdéploiement souffre de problèmes de santé plus sérieux. L'utilisation presque exclusive de cette méthodologie limite la mesure dans laquelle ces études peuvent permettre de déterminer les facteurs préexistants qui influent sur les résultats pour la santé postérieurs au déploiement.

- *Nature des liens étudiés* – Les liens entre les facteurs psychologiques et sociopsychologiques et les SPMI dans le contexte militaire n'ont pas encore été suffisamment étudiés. Environ la moitié des études prises en compte dans l'analyse documentaire n'avaient pas pour but principal de comprendre ces liens. Les quelques études qui n'ont pas traité précisément de ces liens ou de cette association n'ont souvent parlé que de la prévalence de symptômes particuliers au sein de la population étudiée.

Résultats: Facteurs psychologiques et sociopsychologiques répertoriés

Selon l'examen des études clés menées dans le contexte militaire, les principaux facteurs relevés étaient les symptômes et troubles psychologiques. Ces résultats correspondent aux données sur les membres des populations civiles qui se présentent aux services de soins primaires en raison de symptômes physiques. Les facteurs clés les plus souvent déclarés qui semblent être associés à la déclaration de symptômes physiques dans le contexte militaire sont les suivants :

- **ESPT et expositions à des agents stressants psychologiques**

Plus de la moitié des études examinées (14 sur 22) ont révélé que l'ESPT, les symptômes liés à l'ESPT et/ou l'exposition à des niveaux élevés d'agents stressants psychologiques sont associés à un plus grand nombre de déclarations de symptômes physiques. Certaines études examinées faisaient état du niveau *perçu* d'exposition au stress et de son lien avec la déclaration des symptômes physiques.

- **Dépression**

La plupart des études examinées (19 sur 22) ont traité de la dépression et des symptômes physiques. Parmi ces études, la majorité (12 sur 19) portaient sur l'association directe de la dépression avec la déclaration de symptômes physiques dans le contexte militaire.

- **Anxiété**

La moitié des études examinées (11 sur 22) traitaient précisément de l'anxiété dans le contexte d'autres symptômes physiques ou psychologiques. Parmi ces études, sept ont analysé les associations directes entre l'anxiété et la déclaration de symptômes physiques dans le contexte militaire.

- **Somatisation**

Environ le quart des études examinées (5 sur 22) ont porté précisément sur le lien entre la somatisation ou les troubles somatoformes et la présence de symptômes physiques.

Choix des mesures

Afin de déterminer le caractère approprié des instruments, on s'est fondé sur les hypothèses suivantes :

- l'accent doit être mis sur les mesures de l'autodéclaration;
- les mesures proposées possèdent des caractéristiques psychométriques/diagnostiques solides;
- les mesures doivent être pertinentes/adaptées au contexte militaire;
- le fardeau de réponse et le coût de la réponse doivent être pris en considération.

Il a été recommandé d'utiliser les échelles et mesures suivantes dans le cadre de l'EPCADS.

- *Primary Care Evaluation of Mental Disorders – Patient Health Questionnaire* (PRIME-MD-PHQ) (Spitzer, Kroenke et Williams, 1999). Cette échelle peut servir à évaluer les facteurs de la dépression, de l'anxiété et de la somatisation. Elle englobe huit troubles (trouble dépressif majeur; trouble panique; autre trouble anxieux; boulimie; autre trouble dépressif; abus d'alcool ou dépendance à l'alcool probable; trouble somatoforme et épisode d'alimentation excessive).

L'échelle possède des caractéristiques psychométriques raisonnables et a été utilisée dans la plupart des études qui ont porté sur les anciens combattants de la guerre du Golfe; il sera donc possible d'effectuer des comparaisons avec les résultats antérieurs et les résultats actuels. Le fardeau de réponse serait réduit au minimum compte tenu du fait que cette échelle comprend trois facteurs et qu'on estime qu'il faut entre 15 et 25 minutes pour remplir le formulaire selon le nombre de symptômes. Le coût est minime car les auteurs de l'échelle ont autorisé son utilisation dans le cadre de l'EPCADS.

- *Mississippi Scale for Combat-Related Posttraumatic Stress Disorder* (M-PTSD) (Keane, Cadell et Taylor, 1988). Il est proposé d'utiliser cette échelle pour évaluer l'ESPT pour les raisons suivantes : elle possède des caractéristiques psychométriques raisonnables; elle est l'un des instruments les plus couramment utilisés en recherche dans le contexte militaire; le fardeau de réponse est relativement faible (elle inclut 35 à 39 questions selon la version); il faut environ 15 à 20 minutes pour remplir le formulaire. De plus, le coût de l'échelle serait minime vu qu'on a obtenu la permission de l'utiliser.
- *Combat Exposure Scale* (CES) (Keane, Fairbank, Caddell et Zimering, 1989). Cette échelle est conçue pour évaluer l'exposition à des expériences au combat précises. Elle possède des caractéristiques psychométriques raisonnables et est l'un des instruments les plus couramment utilisés en recherche dans le contexte militaire. Par ailleurs, on peut l'adapter de manière à y inclure des questions spécifiques à certains déploiements. Son fardeau de réponse est relativement faible (incluant de 40 à 50 questions selon la version), et il ne faut qu'environ 15 à 20 minutes pour remplir le formulaire. Comme pour les autres échelles, le coût serait minime car les chercheurs peuvent souvent l'utiliser gratuitement ou moyennant un faible coût.
- *Questions supplémentaires du CCEP mesurant l'exposition psychologique au stress* – En plus de la CES, il peut valoir la peine d'ajouter des questions sur l'exposition au stress afin de s'assurer que cet aspect est pris en compte. L'association des questions sur le stress propres au CCEP (celles qui ne chevauchent pas les questions de la CES) au CES permettraient une évaluation approfondie tout en n'entraînant qu'une très légère augmentation du coût ou du fardeau de réponse, vu que certaines questions se répètent dans les deux mesures.

L'association de ces trois échelles et de questions particulières tirées du CCEP fournirait une mesure adéquate de tous les facteurs recensés dans l'analyse documentaire. En outre, le fardeau de réponse et le coût de la mise en œuvre de ces mesures dans le cadre de l'EPCADS seraient beaucoup moindres que ceux des autres mesures qui pourraient être utilisées.

Importance : L'EPCADS a pour but de mettre en place un mécanisme permanent qui offrira aux Forces canadiennes (FC) la possibilité d'analyser les facteurs de risque potentiels pour la santé associés au déploiement. L'une des premières étapes critiques de cette initiative consiste à répertorier correctement les facteurs psychologiques et sociopsychologiques clés qui peuvent entrer en ligne de compte dans l'ESPT et à choisir les meilleures mesures possibles pour évaluer ces facteurs. Une fois mise en œuvre, la base de données de l'EPCADS permettra au Directeur général - Services de santé (DGS San) d'analyser les données recueillies de façon régulière. Les FC disposeront ainsi de l'information voulue pour déceler les facteurs de risque pour la santé et mettre en branle des stratégies préventives de gestion des risques.

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1.0 Introduction

The purpose of the present project is to identify suitable measurement tools for psychological and social-psychological factors that have been previously identified in the medical and psychological literature as related and/or implicated with medically unexplainable physical symptoms (MUPS). Identification of these tools will assist in the work currently being developed by the Directorate of Medical Policy in its efforts to conduct a Prospective Health Data Analysis Capability Study (PHDACS). The aim of this initiative is to introduce a permanent mechanism that will provide the Canadian Forces (CF) with the possibility to analyse, on a permanent basis, prospective deployment health risk factors. One element making up the initiative will include a data repository and search element that will include demographic, clinical, environmental, social and psychological measures. The second element of this initiative will be to establish routine administrative processes through which there will be continuous collection of data on military members during their career. This initiative once implemented will permit the Director General Health Services (DGHS) to analyse collected data on an ongoing basis providing CF with the ability to identify health risk factors and initiate preventative risk management strategies.

This report contains the findings from the literature review and identification of suitable questionnaire measures. The first step was to identify the main psychological and social-psychological factors that have been associated with MUPS among military personnel. The second step involved the identification of the various instruments that potentially could be used for the PHDACS.

This report is composed of three main sections. In this section we present this brief introduction and provide details with regards to the approach we used in reviewing the literature in addition to the limitations of the literature reviewed in informing PHDACS. Section 2.0 contains the findings from the literature review with regards to the main psychological and social-psychological factors that are associated with MUPS. Section 3.0 contains an overview of the measures that were reviewed for possible inclusion in the PHDACS.

1.1 Approach to Identification of Factors

The scope of the literature review was characterised by the following parameters:

- The literature review should focus primarily on both medical and psychological literature from academic peer-reviewed journals;
- Some considerations could be made for appropriate "grey" literature if the report findings are deemed to be scientifically rigorous and relevant;
- The time period covered was approximately the past ten years;
- The focus should remain on psychological and social-psychological factors related to MUPS and not on physiological etiology of MUPS; and,

- The review of literature should primarily be restricted to the military context, and then, if necessary, be broadened to include studies of sub-populations outside of the military context.

Identification of articles, chapters and reports was through searches using on-line databases including *PsychINFO*, *HealthSTAR*, and *MEDLINE*. From the articles reviewed, 22 articles were determined to be key articles according to the parameters outlined above. The key articles are specified in Table 1. The articles were reviewed using an analysis grid to identify common themes, findings and measures.

1.2 Challenges in Applying Findings from the Literature

The literature review identified some challenges to consider when determining to what extent it is possible to identify psychological and social-psychological factors related to MUPS from the current literature. These challenges are described briefly below.

1.2.1 Defining Medically Unexplained Physical Symptoms

One aspect that makes it difficult to ascertain the relevancy of studies is the lack of common usage regarding the term "medically unexplained physical symptoms" in either the psychological or the medical literature. There appears to be two main approaches to understanding or defining the "unexplainable" aspect of physical symptoms. The approach used in the majority of studies reviewed is to emphasize that the etiology of the symptom and/or condition is unknown. Using this approach, researchers emphasize identifying a cause or reason for the prevalence of a specific symptom or group of symptoms. In this way, the physical symptoms are unexplained because their cause is unknown.

The alternative approach emphasizes a set of physical symptoms that do not define a known condition. The unexplained aspect is that the symptoms do not combine in such a way to define known syndromes or conditions. This challenge in explaining physical symptoms has been captured under formal diagnostic systems such as the ICD-9-CM Codes 780-799 or ICD-10 that define "Signs, Symptoms, and Ill-defined Conditions". The focus of these types of studies is to understand the underlying structure for various combinations of physical symptoms (e.g., syndrome, disorder)

With the literature somewhat divided according to what aspect of the physical symptoms is "unexplainable", it becomes challenging to accurately ascertain which psychological and social-psychological factors are related to MUPS. For the present review, we have chosen an inclusive approach to understanding the factors involved in MUPS. As a result, we have included studies that have focused both on physical symptoms unexplained because of unknown etiology, and physical symptoms unexplained because they do not define specific syndromes or conditions. The rationale for being inclusive for the present project is to attempt to have as broad an understanding as possible of potential factors involved in MUPS. Given the objectives and early stage of development of the PHDACS, it is important to be relatively inclusive in identifying factors and measures that will assist in understanding MUPS among Canadian Forces personnel.

1.2.2 Military Populations Studied

Another challenge in applying the findings from the studies that were identified as key studies for the present project is the limited populations studied. Almost all of the recent studies regarding MUPS in military populations have focussed on US Gulf War Veterans (GWVs). Of the 22 studies identified as key studies, 20 involved studying US GWVs. In addition, over one-half of these studies have focussed on US GWVs who have presented as part of the US military's Comprehensive Clinical Evaluation Program (CCEP) that provides a voluntary, clinical evaluation for GWVs with Gulf War health concerns. The CCEP was established by the US Department of Defense in 1994 once health concerns began to arise among US GWVs. Participants can enrol in the CCEP by contacting their local military medical treatment facility or by calling a toll-free number that provides information and referrals to individuals requesting medical evaluations. Once an individual is referred, the CCEP provides a two-phase, comprehensive medical evaluation. The first phase involves a thorough medical examination comparable to an inpatient hospital admissions evaluation as well as standard laboratory tests. Individuals who require additional evaluation may be referred for Phase II evaluations that consist of symptom-specific examinations, additional laboratory tests, and specialty consultations as required. With much of the research having been conducted with a specific military population with potentially unique exposures and experiences, some findings regarding psychological and social psychological factors may not be as generalizable to CF personnel in various deployment situations.

1.2.3 Reliance on Post-deployment Measures

Given that most studies of MUPS focused on GWVs once concerns had been raised of the possibility of increased health outcomes for this group post-deployment, many of the studies were only able to administer measures and evaluations post-deployment. The nearly exclusive use of this methodological approach limits the extent to which these studies can identify the pre-existing factors that have an impact on health outcomes post-deployment. As a result, most of the findings from the present literature review rely on psychological and social-psychological factors that were found to co-exist with physical symptoms post-deployment. This is somewhat limiting given that it is difficult to assess to what extent the various psychological and social-psychological factors existed prior to deployment and exposure.

1.2.4 Nature of the Relationship Studies - Direct and Indirect Association

The relationship between psychological and social-psychological factors with MUPS in the military context remains understudied. Approximately one-half of the studies that were identified for review did not have the understanding of this relationship as their main focus. The group of studies that did not specifically report on the relationship or association often reported only the prevalence of specific symptoms within the population studied. These studies still informed the literature review to the extent that in many instances, the prevalence of different types of symptoms was high enough that co-occurrence of psychological and physical symptoms would be present. The difficulty in applying the information from these studies is that, as the main focus not one of understanding the relationship; various inferences must be made in order to have them inform the present project such as overlapping prevalence rates. For example, 80% prevalence of psychological symptoms and 70% prevalence of physical symptoms would have as minimum a co-occurrence rate of 50%. In the presentation of studies reviewed, these studies are identified as studies that demonstrate *indirect associations*.

The studies that specifically focus on the relationship between the factors and MUPS most frequently presented the co-occurrence of psychological symptoms with physical symptoms post-deployment. These studies have been identified as studies demonstrating *direct associations*.

2.0 Psychological and Social-Psychological Factors

From a review of the key studies that have been conducted in the military context, the main factors identified were primarily psychological symptoms and disorders. This finding is concurrent with findings from civilian populations presenting in primary care with physical symptoms. In this section, we briefly review the studies set in a civilian context that can inform the present project, present the key studies set in a military context, and briefly describe the findings for each of the factors identified.

2.1 Studies in the Civilian Context

One of the main impetuses for many of the studies examining the link between psychological factors and physical symptoms has been the non-diagnosis of mental disorders at the primary care level. In a through review of this relationship approximately 20 years ago, Katon and colleagues reviewed the relationship between depression and somatization documenting the incidence and prevalence of depression in primary care and the rate of misdiagnosis (Katon, Kleinman & Rosen, 1982a; 1982b). In a more recent study of 1000 civilian adult clinical patients, the investigators found that the presence of at least one physical symptom increased the likelihood of a diagnosis of a mood or anxiety disorder two to three-fold. As the number of physical symptoms of reported increased, the likelihood of a psychiatric disorder increased substantially (Kroenke, Spitzer, Williams, Linzer, Hahn, deGruy & Brody, 1994). Similarly, in another study, investigators studied 500 civilian adults presenting to a general medical clinic. Results showed that nearly one-third (29%) of patients had a diagnosable anxiety or depressive disorder. Some of the main predictors of the presence of an anxiety or depressive disorder were recent stress, multiple physical symptoms, higher ratings of symptom severity, and lower ratings of overall health (Kroenke, Jackson & Chamberlin, 1997). In a study of 767 "high utilizers" of primary clinics, Katon and colleagues found that patients with many unexplained physical symptoms met the DSM-III-R criteria for somatization disorder. As well, and just as importantly, many of the patients who were just below the diagnostic threshold for somatization disorder were also exhibiting high levels of clinical and behavioral features of somatization, anxiety and depression (Katon, Lin, Von Korff, Russo, Lipscomb & Bush, 1991).

Using large scale epidemological data from the National Institute of Mental Health (NIMH) Epidemiologic Catchment Area (ECA), Simon and VonKorff (1991) studied whether residents with high levels of somatic symptoms also reported psychological distress. Results showed that among residents reporting five or more somatic symptoms, the rate of psychological symptoms was 63%. The rate of a psychiatric diagnosis among this group was approximately 50%. Overall, the somatic symptoms showed the strongest associations with anxiety and depressive symptoms. Similarly, another epidemiological study (Simon, Gater, Kisley, & Piccinelli, 1996) using data from the international World Health Organization collaborative study of psychological problems in general health care demonstrated that the number of reported physical symptoms was directly related to the level of psychological distress among patients ($r = .42$). Anxiety and depressive symptoms demonstrated the strongest relationship to the number of physical symptoms. Interestingly, the type of physical symptom (e.g., gastrointestinal, musculoskeletal, etc.) did not show differential association with psychological distress.

Other studies have shown a link between physical symptom reporting and post-traumatic stress disorder. McFarlane (1994) in a study of firefighters who had been intensely exposed to a fire found that those who had developed PTSD were more likely to report physical symptoms (most commonly

musculoskeletal at 45%) in comparison to those who had not developed PTSD. The investigators concluded that it is not the exposure to disaster, but rather the development of PTSD that led to the physical symptoms.

2.2 Studies in the Military Context

Within the parameters to define the focus for the present review (as discussed in Section 1.1), 22 studies were identified as being key to providing relevant information. These key studies are summarized in Table 1. The following information is provided for each study reviewed:

- ***Authors*** – The authors for each study are presented. A full reference citation for the study reviewed is found in two places. The reference for each study is contained in the complete reference list found at the end of this report. As well, for the 22 selected studies, we have included the full abstract for further information in Appendix A.

- ***Population*** – In order to understand the relevance and strength of a particular study, we have included the specific population studied, as well as sample sizes.

- ***Physical Symptoms & Conditions*** – This outlines the specific physical symptoms and/or conditions that were being included in the study. These vary from strict physical symptoms (e.g., nausea, musculoskeletal pain) to some that would fall more into the realm of cognitive complaints normally associated with neurological impairment of some type (e.g., memory, difficulty concentrating). In many instances, it was difficult for the reviewers to determine to what extent the cognitive complaints were more appropriate as physical symptoms or psychological symptoms. As a result, cognitive symptoms appear in physical symptoms if the author took more of a neurological approach to defining and understanding them. In contrast, they appear in the psychological factors column if the study's author took more of a psychological approach to understanding them such as mood, stress, etc.

- ***Possible Psychological and Social Psychological Factors*** – The psychological and social-psychological factors studies in association with the physical symptoms are presented in this section. They range from individual psychological symptoms (e.g., irritability, feeling moody) to mental disorders (e.g., PTSD, Major Depressive Disorder) to psychological constructs (e.g., experience of exposure to stress, coping strategies).

- ***Measures*** – Given the purpose of the review, we also listed the specific measures that were used to study the various psychological and social psychological factors.

- ***Association*** – As discussed in Section 1.2.4, the nature of the association between psychological factors and physical symptoms varied considerably given the focus or purpose of a specific study. As a result, we have presented the type of association that was presented in each study to assist the reader in understanding the level of inference that was required by the reviewer. It should be noted that the stronger findings in relation to the present study result from those studies that examined a direct association.

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Table 1. Summary of Key Studies

AUTHORS	POPULATION	PHYSICAL SYMPTOMS & CONDITIONS	POSSIBLE PSYCHOLOGICAL & SOCIAL PSYCHOLOGICAL FACTORS	PSYCHOLOGICAL MEASURES	TYPE OF ASSOCIATION
Baker, Mendenhall, Simbartl, Magan, & Steinberg (1997)	US GWVs (n=188) 94 treatment –seeking 94 non-treatment seeking	Nausea, muscle ache, fatigue, dizziness, back pain, stomach ache, and numbness	PTSD symptoms	M-PTSD	Direct (between group design)
Binder, Storzbach, Anger, Campbell, & Rohlman (1999)	US GWVs (n=169) 100 cases 69 controls	Cognitive complaints (memory, decision-making, concentration)	Depression Anxiety	BDI BAI	Direct (correlation)
Coker (1999)	US GWVs (n=1000) assessment seeking	Fatigue, joint and muscle pain, and cognitive symptoms	Affective symptoms (mood swings, personality change, irritability, depression) PTSD	ICD-10 Classification	Indirect (49% frequency in group overall)
Engel, Ursano, Magruder, Tartaglione, Jing, Labbate, & Debakey (1999)	US GWVs (n= 11,259) assessment seeking	Non-psychological medical condition (ICD-9 classification)	Somatoform Anxiety/depression PTSD	SCID-NP CAPS	Indirect (37% frequency in group overall)
Fiedler, Lange, Tiersky, DeLuca, Plicastro, Kelly-McNeil, McWilliams, Korn, & Natelson (2000)	US GWVs (n = 103) assessment seeking 45 "healthy" controls 25 CFS 35 CFS/psychiatric disorder	Chronic fatigue syndrome, Idiopathic chronic fatigue,	Social desirability Neuroticism Combat exposure to stress Negative coping strategies	CES PERI Childhood Traumatic Events Scale NEO-PI Coping Responses Inventory Marlowe Crowne (SD)	Direct (between group design)
Fukuda, Nisenbaum, Stewart, Thompson, Robin, Washko, Noah, Barrett, Randall, Herwaldt, Mawle & Reeves (1998)	US Air Force GWVs (n= 3723 questionnaire, n=158 clinical eval)	Chronic non-specific symptoms grouped as fatigue and musculoskeletal pain	Mood-cognition symptoms: - Feeling depressed -Feeling anxious -Feeling moody/irritable -Difficulty concentrating	MOS-SF 36	Direct (reports the frequency of multi-symptom categories)

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AUTHORS	POPULATION	PHYSICAL SYMPTOMS & CONDITIONS	POSSIBLE PSYCHOLOGICAL & SOCIAL PSYCHOLOGICAL FACTORS	PSYCHOLOGICAL MEASURES	TYPE OF ASSOCIATION
Goss Gilroy Inc (1998)	Canadian GWVs and no-GWVs (n= 3113 GWVs, n=3439 controls)	Chronic Fatigue Fibromyalgia Respiratory Diseases Multiple Chemical Sensitivity Cognitive dysfunction	PTSD Depression Anxiety Exposure to Psychological Stressors	PRIME-MD PCL-M CCEP exposures list	Direct (exposure to psychological stressors among GWVs were found to be related to reported health outcomes) & Indirect (GWVs were more likely to report health outcomes including psychological health outcomes such as PTSD, Depression and Anxiety than non-GWVs)
Gray, Kaiser, Hawksworth, Hall, & Barrett-Connor (1999)	US Seabee (n=527 GWVs; n=970 non-deployed)	Fatigue, sleep problems, headaches, joint and muscle pain, rashes, respiratory problems, gastrointestinal problems	Depression Anxiety Confusion/Forgetfulness Anger/Irritability Somatization Obsessive-Compulsive Interpersonal Sensitivity	Hopkins Symptom Checklist	Indirect (reports on frequencies of individual symptoms)
Haley, Kurt, & Horn (1997)	US Naval GWVs (n=249)	Major symptoms commonly associated with post-Gulf War illness (6 symptom groups)	Somatic complaints (Conversion) Anxiety Depression Schizophrenia	PAI	Direct (reports on PAI results according to 6 symptom groups and asymptomatics)
Iowa Persian Gulf Study Group (1997)	US Military (n=4886) GWVs both regular and reserve Non-GWVs both regular and reserve	Chronic fatigue Respiratory disease Fybromyalgia Reproductive health Injuries Cancer	Depression PTSD Cognitive dysfunction Anxiety Alcohol abuse	PRIME-MD and Various other scales	Indirect (reports on frequencies of individual condition and not comorbidity of psychiatric and medical conditions; population-based study)
Kroenke, Koslowe & Roy (1998)	US GWVs (n=18,495) assessment seeking	Joint pain, fatigue, headache, memory/concentration difficulties, sleep problems, and rash	Depression Anxiety	ICD-9 (CCEP participants)	Direct (increased excess prevalence with psych disorders)
Labbate, Cardena, Dimitreva, Roy & Engel (1998)	US GWVs (n=131) Phase 2 from CCEP	Not readily explainable somatic symptoms	Depression Somatoform disorder PTSD	SCID-P CAPS	Direct (high prevalence of Axis I disorders among group)

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AUTHORS	POPULATION	PHYSICAL SYMPTOMS & CONDITIONS	POSSIBLE PSYCHOLOGICAL & SOCIAL PSYCHOLOGICAL FACTORS	PSYCHOLOGICAL MEASURES	TYPE OF ASSOCIATION
Lange, Tiersky, DeLuca, Peckerman, Pollet, Policastro, Scharer, Ottenweller, Fielder & Natelson (1999)	US GWVs (n=95) 53 with Gulf War Illness; 42 with no post-war health problems	Chronic Fatigue Syndrome Idiopathic Chronic Fatigue Multiple Chemical Sensitivity	Depression PTSD	Q-DIS-III-R	Direct (comparison of prevalence of Axis I Disorders between fatigued and healthy GWVs)
Nisenbaum, Barrett, Reyes & Reeves (2000)	US Air Forces GWV (n=1002)	Fatigue Musculoskeletal	Mood-cognition - feeling depressed - difficulties remembering/concentrating -feeling moody - feeling anxious - trouble finding words - sleeping problems Exposure to specific stressors - traumatic events (NS) - perception of threat* - family issues (NS)	CCEP (same approach used in Fakuda et al. 1998)	Direct (measured three main symptom groups and reports co-occurrence of Mood-cognition symptoms with fatigue and musculoskeletal symptoms; and the relationship with exposure to specific stressor
Pierce (1997)	US GWVs (n=525) women GWVs in active theatres compared with non-active	General health status Gynecologic and reproductive health Skin rashes Insomnia Weight loss Memory	Depression Parental status	Hopkins Symptoms Checklist SCL-9? Mississippi-PTSD	Indirect (compared prevalence rate between active and non-active; parental status related to increased number of symptoms)
Proctor, Heerca, White, Wolfe, Borgos, Davis, Pepper, Clapp, Sutker, Vastertine & Ozonoff (1998)	US GWVs (n=291) and a group in Germany (n=50)	9 Body systems (BSS scores) divided into High/Low symptom reporting units and individuals (Health Symptom Checklist)	PTSD Depression	CAPS Brief Symptom Inventory; Combat Exposure Scale	Direct (PTSD and Depression significantly related to all symptom sets (BSSs)

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AUTHORS	POPULATION	PHYSICAL SYMPTOMS & CONDITIONS	POSSIBLE PSYCHOLOGICAL & SOCIAL PSYCHOLOGICAL FACTORS	PSYCHOLOGICAL MEASURES	TYPE OF ASSOCIATION
Roy, Koslowe, Kroenke & Magruder (1998)	US GWVs (n=21,579) CCEP Phase I and Phase II plus Walter Reed	SSID as primary or secondary diagnoses (most common fatigue, headache, and memory loss)	Mood disorders Somatoform Tension Headache PTSD	PRIME-MD MMPI-2 CCEP assessment	Direct (ratio of SSID reduced from 1:4 to 1 10 to 1:100 as depth of evaluation increases; many of these changes (45%) in diagnosis are as a result of a diagnoses of a psychological disorder) Likelihood of diagnosis of a psychological disorder directly proportional to the level of evaluation.
Sillanpaa, Agar, Milner, Podany, Axelrod & Brown (1997)	US GWVs (n=49)	Neuropsychological functioning: - sustained attention - motor coordination - executive functioning Subjective complaints (somatization)	Depression Trait anxiety	MMPI-2 SCL-90-R State Trait Anxiety Inventory	Direct (depression was related to motor coordination, subjective complaints, and exec functioning, trait anxiety related to attention)
Storzbach, Campbell, Binder, McCauley, Anger, Rohlman, Kovera (2000)	US GWVs (n=241 with unexplained symptoms, 113 without symptoms)	Musculoskeletal pain type Unexplained fatigue type	Cognition/Psychological type – (Memory loss, difficulty concentrating, difficulty learning new things, sleep disturbances, mood swings and irritability, depression, anxiety) PTSD. Mood symptoms (anxiety and depression), psychiatric symptoms, greater combat exposure, exposure in last year to negative events with feelings of less control	Mississippi – PTSD Penn Inventory PCL-C SF-36 BAI BDI SASSI-2 SCL-90-R MMPI-2 PANAS LES CES-R	Direct (Cognitive/Psych symptom types were coexistant with musculoskeletal or fatigue system in approx 65% of participants). Participants with at least one of 3 symptom groups also scored higher in levels of psychological distress and symptoms as well as combat exposure and negative events in past year

AUTHORS	POPULATION	PHYSICAL SYMPTOMS & CONDITIONS	POSSIBLE PSYCHOLOGICAL & SOCIAL PSYCHOLOGICAL FACTORS	PSYCHOLOGICAL MEASURES	TYPE OF ASSOCIATION
Unwin, Blatchley, Coker, Ferry, Hotopf, Huyll, Ismail, Plamer, David & Wessely (1999)	UK GWVs, non-deployed and Bosnia veterans (men only) (n= 4248 GWVs, n=4246 non-deployed, n=4250 Bosnia veterans)	Fatigue Musculoskeletal	PTSD symptoms Psychological distress	Similar to measures used in Iowa study	Indirect (reports on frequencies of individual condition and not comorbidity of psychiatric and medical conditions; population-based study)
Wagner, Wolfe, Rotnitsky, Proctor & Erickson (2000)	US GWVs (n=2301)	Common cold/flu, dizziness, general aches and pains, hands sweat and feel damp and clammy, headaches, muscle twitching/trembling, rapid heartbeat, shortness of breath, skin rashes, and nausea	PTSD Combat exposure	Combat Scale – Lafeur Mississippi-PTSD BSI	Direct (# of physical symptoms 2 years post was predicted by the level of PTSD symptomology immediately post)
Wolfe, Proctor, Erickson, Heeren, Friedman, Huang, Sutker, Vasterling & White (1999)	US GWVs (n=204 GWVs; n=48 non-GWVs)	BSS scores on 8 scales: Cardiac, Dermatological, Gastrointestinal, Genitourinary, Musculoskeletal, Neurological, Neuropsychological, Pulmonary	PTSD Major Depression Disorder	Combat Scale – Lafeur CAPS Mississippi-PTSD SCID	Direct (GWVs with war-related PTSD or MDD described significantly more health problems)

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2.3 Psychological and Social-Psychological Factors Identified

As demonstrated in Table 1, there are a number of psychological and social-psychological factors that have been associated with the reporting of a variety of physical symptoms. The most frequently reported key factors that appear to be associated with reporting of physical symptoms in the military context are:

- PTSD and exposure to Psychological Stressors;
- Depression;
- Anxiety; and
- Somatization

Below, we briefly describe each of these according to what has been identified in the key studies.

2.3.1 PTSD and Exposure to Psychological Stressors

Over one-half of the studies reviewed (14 of 22) identified PTSD, PTSD-symptoms, and/or exposure to high levels of psychological stressors as being associated with increased levels of reporting of physical symptoms. Ten of these studies looked at direct associations between PTSD and/or stress exposure and physical symptoms.

Direct Associations between PTSD and Physical Symptoms

One of the initial studies examining the direct association between PTSD and physical symptoms among US GWVs was the study by Baker et. al (1997). Baker compared the number and types of physical symptoms from US GWVs who either tested positive or negative for PTSD based on the scores from the Mississippi PTSD Scale. They found that the frequency of reporting of fatigue, nausea, muscle aches, dizziness, back pain, stomach ache and numbness were more likely to be reported by those with PTSD, than those without PTSD. Similarly, Labatte et al. (1998) attempted to determine if there was a relationship between PTSD and physical complaints among US GWVs. They studied 131 Phase II patients from the CCEP who presented with not readily explainable somatic symptoms and found that there was a higher prevalence of PTSD and non-specific somatic symptoms among those who also reported exposure to traumatic events. As well, Wolfe et al. (1999) examined to what extent PTSD and Major Depressive Disorder (MDD) were associated with physical health complaints among GWVs. The investigators found that GWVs with PTSD or MDD describe significantly more health problems than those veterans without these diagnoses

In the attempt to determine to what extent psychiatric disorders can explain fatiguing illness among GWVs, Lange et al. (1999) found that approximately one-half of those GWVs that presented with fatiguing illness (49%) had similar psychiatric profiles to "healthy" GWVs. The other one-half (51%) of GWVs with fatiguing illness were significantly different on their

psychiatric profiles from "healthy" GWVs with the one of the most frequently reported diagnoses being PTSD.

In a study designed to compare deployed and non-deployed GWVs, Proctor et al. (1998) reported that the presence of PTSD as measured with the CAPS and Mississippi-PTSD was directly related to the various symptom sets as measured by the Health Symptom Checklist. However, it should also be noted that the relationship between physical exposures (e.g., tent heaters, pesticides) and health symptoms remained once occurrence of PTSD and Depression were controlled for in the regression equations.

In one of the strongest studies of the role of psychological factors in reporting unexplainable physical symptoms, Roy et al. (1998) examined the data from US GWVs who presented to the CCEP and were diagnosed with sign, symptoms and ill-defined conditions (SSID) in all phases of evaluation. It was found that SSID diagnoses were reduced by 1:4 to 1:10 to 1:100 depending on the depth of evaluation. As SSID diagnoses were evaluated in further depth, many of the SSID diagnoses (45%) were replaced with psychological diagnoses, primarily mood disorders, somatoform disorders, tension headaches, and PTSD. According to the investigators, these findings are related to other primary care studies in which it has been found that many of the symptoms reported by GWVs are compatible with those found in non-military populations presenting with physical symptoms, and having diagnosable mood and anxiety disorders.

In one of the few population tests that did not use the CCEP pool of respondents presenting for assessment, the investigators compared a group of GWVs who presented with unexplained symptoms (both physical and psychological) with GWVs who did not report any unexplained symptoms. GWVs reporting unexplained symptoms also reported increased levels of distress and psychiatric symptoms in comparison to the no-symptom group. One of these between group differences included higher rates of PTSD among those also reporting unexplained symptoms.

Finally, in a study to determine to what extent PTSD symptoms are directly related to physical symptom reporting approximately two years post-exposure, Wagner et al. (2000) measured GWVs level of PTSD symptoms at the time they returned from combat, and then their level of physical symptoms two years post-exposure. They found that the degree of PTSD symptomotology immediately after returning from the Gulf War was predictive of self-reported health problems two years later even when demographic variables, degree of combat exposure and initial levels of health problems were held constant.

Indirect Associations between PTSD and Physical Symptoms

While the previous studies directly measure the association between PTSD and physical symptoms, some other studies have examined this association in a more indirect fashion. Coker et al. (1999) examined the first 1000 GWVs who presented at the CCEP. The investigators calculated rates of various disorders and diseases based on the ICD-10, however, there was limited discussion regarding the amount of overlap between Chapter 18 symptoms (unexplained) and PTSD as well as other psychological factors. However, given that affective and/or PTSD symptoms were present in approximately 49% of the sample, it can be assumed that there would be some overlap present. Similarly, Engel et al. (1999) analysed

administrative data from the first year of the CCEP and found that while 90% of those presenting had a non-psychological medical condition, approximately 37% of the sample had at least one psychological condition with 6% having developed PTSD. It should be noted that these results are based primarily on Phase I of the CCEP. Given Roy et al. (1999) findings that many of the non-psychological medical conditions are replaced with psychological conditions upon further evaluation, the overlap may actually be higher.

Other studies that examined more indirect associations between PTSD and Physical Symptoms include the Goss Gilroy Inc. (1998) study that reported on the prevalence of specific health outcomes, including PTSD among deployed Canadian GWVs in comparison with non-deployed CF personnel. Canadian GWVs were found to have higher prevalence than non-deployed CF personnel for most long term health problems, in particular problems with bones and joints, allergies, and gastrointestinal. As well, the GWVs exhibited a higher prevalence than non-deployed CF personnel of PTSD (both physician diagnosis and self-reported symptoms). This category also includes the Iowa Persian Gulf Study (1997) that reported the frequencies of individual conditions, but not the co-occurrence of conditions.

Direct Associations between Stress Exposure and Physical Symptoms

A number of reviewed studies included the perceived level of exposure to stress and the relationship it has with reporting physical symptoms. Most relevant is the Goss Gilroy Inc. (1998) study that found increased exposure to psychological stressors among Canadian GWVs was directly related to higher levels of reported health outcomes (including physical health outcomes). Similarly, Nisenbaum et al. (2000) reported that among US GWVs, reporting of fatigue and musculoskeletal symptoms was related to the level of exposure to specific stressors. As well, Strozbach et al. (2000) found that participants who more frequently reported musculoskeletal pain and unexplained fatigue reported increased levels of combat exposure and negative events in the past year.

Finally, Fiedler et al. (2000) examined the role that exposure to stress and coping styles played among GWVs who presented with chronic fatigue. The investigators examined three groups, namely those with chronic fatigue and a psychiatric disorder, those who only had chronic fatigue, and a group of healthy controls. Overall, there were differences between the chronic fatigue groups and the controls on negative coping styles with the chronic fatigue group with psychiatric disorders reporting the highest scores, followed by the chronic fatigue with no psychiatric disorders, followed by the control group. Both chronic fatigue groups remained similar with an overall elevated level of reported stress due to combat exposure in comparison to the control group. Interestingly, there were no significant differences found among the three groups with regards to the levels of post-war stress.

2.3.2 Depression

Most of the studies (19 out of 22 studies) reviewed examined depression and physical symptoms. Of these, the majority (12 out of 19 studies) examined the direct association of depression with the reporting of physical symptoms in the military context.

Direct Associations between Depression and Physical Symptoms

One of the largest studies examining this association was conducted by Kroenke et al. (1998) using data from the CCEP. The investigators examined the onset of symptoms among GWVs, as well as the actual number of symptoms that GWVs were reporting. Depressed mood was found to correlate with fatigue (.37), memory or concentration problems (.41) and sleep disturbance (.38). As well, a relationship was found between the number of physical symptoms reported and the likelihood of a co-existing psychological diagnosis. Similarly, Fukuda et al. (1998), Nisenbaum et al. (2000), and Storzback et al., (2000) found overlap between feelings of depression and fatigue and musculoskeletal pain among GWVs.

Depression or depressive symptoms in GWVs have also been found to be related to cognitive complaints (Binder et al., 1999), chronic fatigue and multiple chemical sensitivity (Lange et al., 1999), not readily explainable somatic symptoms (Labbatte et al., 1998), major symptom groups most commonly associated with post-Gulf War illness (Haley et al. 1997), symptom sets as measured by the Health Symptom Checklist (Proctor et al., 1998; Wolfe et al., 1999), and neuropsychological functioning (Silanpaa et al., 1997).

Indirect Associations between Depression and Physical Symptoms

A number of studies measured depressive symptoms along with physical symptoms without making direct associations between the two. Goss Gilroy Inc. (1998) reported that GWVs were more likely to report depressive symptoms along with other physical health outcomes in comparison with non-GWVs. Similarly, the Iowa Persian Gulf Study Group reported higher levels of depression and other psychological and physical symptoms among GWVs in comparison with non-GWVs. As well, numerous other studies have reported the prevalence of depression among GWVs along with other physical symptoms without a direct association being made (e.g., Coker et al., 1999; Engel et al., 1999; Gray et al., 1999; Pierce, 1997; and Unwin et al., 1999).

2.3.3 Anxiety

One-half of the studies reviewed (11 out of 22 studies) specifically examined anxiety in the context of other physical or psychological symptoms. Of these, seven examined direct associations of anxiety with the reporting of physical symptoms within a military context. All of the studies that examined anxiety among GWVs, also studied depression.

Direct Associations between Anxiety and Physical Symptoms

Similar to the findings with depressive symptoms, the largest study to examine the direct relationship between anxiety and physical symptoms was conducted by Kroenke et al. (1998). Anxiety, along with somatoform disorder, and depression made up a "psychological diagnoses" group that was then found to be predictive of the number of symptoms being reported by a patient. Anxiety was also found to be related to cognitive complaints such as problems with memory and concentration (Binder et al., 1999), fatigue and musculoskeletal pain (Fukuda et al., 1998; Nisenbaum et al., 2000; Storzbach et al., 2000), major symptom groups associated with post-Gulf War illness (Haley et al. 1997), and neuropsycholgical functioning (Sillanpaa et al., 1997).

Indirect Association between Anxiety and Physical Symptoms

Again, similar to depression, a number of studies measured anxiety along with other psychological and physical symptoms producing an indirect measure of association (e.g., Engel et al., 1999; Goss Gilroy Inc., 1998; Gray et al., 1999; and, Iowa Persian Gulf Study Group, 1997).

2.3.4 Somatization

Approximately one-quarter of the studies reviewed (5 out of 22 studies) specifically examined the relationship between somatization or somatoform disorders and the presence of physical symptoms. Three of the studies examined the direct association between physical symptoms and somatoform disorder.

Direct Associations between Somatization and Physical Symptoms

The most definitive study of those reviewed regarding somatization was that conducted by Roy et al. (1998). As stated previously in the section on PTSD, the investigators for this study examined the data from US GWVs who presented to the CCEP and were diagnosed with the sign, symptoms and ill-defined conditions (SSID) in all phases of evaluation. It was found that SSID diagnoses were often replaced (45%) with psychological diagnoses as the level of evaluation became more in-depth. Somatoform disorders, along with mood disorders and PTSD were found to be the primary replacement diagnoses. Other studies have found that somatoform disorder is directly related to major symptoms commonly associated with post-Gulf War illness (Haley et al., 1997), and not readily explainable somatic symptoms (Labbate et al., 1998).

Indirect Associations between Somatization and Physical Symptoms

The two studies that reported levels of somatization among GWVs also reported the prevalences of other psychological and physical symptoms. Gray et al. (1999) administered to both GWVs and non-GWVs a symptom checklist including both physical and psychological symptoms, and the Hopkins Symptom Checklist measuring the five psychological dimensions of somatization, obsessive-compulsive, interpersonal sensitivity, depression and anxiety. Overall, GWVs reported significantly more symptoms than non-GWVs. Similarly, Engel et al. (1999) found that from a CCEP sample 90% of GWVs had a non-psychological complaint and approximately 14% could be classified as having a somatoform disorder.

3.0 Selection of Measures

The purpose of the present section is to present measures that may be suitable for the assessment of PTSD, exposure to stress, depression, anxiety, and somatization within the context of the PHDACS. In determining the suitability of instruments, we have made the following assumptions. If any of these assumptions are not appropriate, then it will require that this section be re-visited to determine the most appropriate measures. Our assumptions are that:

- the focus should be on self-report measures;
- the measures proposed have solid psychometric/diagnostic properties;
- the measures be relevant/sensitive to the military context; and,
- there should be considerations made with regards to response burden and cost.

Our beginning point in suggesting appropriate measures was to examine those that had been used in the 22 key studies reviewed. Approximately 25 different measures were used depending on the actual constructs being measured, and whether the study was part of an overall evaluation (e.g., CCEP). Of these measures, we reviewed the following according to factor:

PTSD

- Post-traumatic Stress Diagnostic Scale (Foa, 1995)
- Mississippi Scale for Combat-Related Posttraumatic Stress Disorder (Keane, Cadell, & Taylor, 1988)

Exposure to Stress

- Combat Exposure Scale (Keane, Fairbank, Caddell & Zimering, 1989)
- CCEP Psychological Exposures to Stress (items in Goss Gilroy Inc. report, 1998)

Depression

- Beck Depression Inventory II (Beck, 1999)
- Hamilton Depression Inventory (Reynolds & Kobak, 1994)
- SCL-90-R (Derogatis, 1975)
- PRIME-MD PHQ (Spitzer, Kroenke, & Williams, 1999)

Anxiety

- Beck Anxiety Inventory (1993 Edition) (Beck, 1999)
- SCL-90-R (Derogatis, 1975)
- PRIME-MD PHQ (Spitzer, Kroenke, & Williams, 1999)

Somatization

- PRIME-MD PHQ (Spitzer, Kroenke, & Williams, 1999)

- SCL-90-R (Derogatis, 1975)
- Personality Assessment Inventory (Morey, 1991)

We have developed tables in Appendix B that outline cost, length, format, psychometric properties, whether it has been used in a military context, and other miscellaneous findings. Each test's details can be found in Appendix B.

Taking these factors regarding test characteristics into account, we recommend the following be considered for use in the PHDACS.

Primary Care Evaluation of Mental Disorders – Patient Health Questionnaire (PRIME-MD-PHQ)

Our rationale for using this scale to assess factors of depression, anxiety and somatization is the following:

- Covers three of the psychological factors identified as being related to MUPS namely Depression, Anxiety and Somatization as well as other disorders. The specific 8 disorders assessed are:
  - Major depressive disorder (DSM-IV)
  - Panic disorder (DSM-IV)
  - Other anxiety disorder (DSM-IV)
  - Bulimia nervosa (DSM-IV)
  - Other depressive disorder (sub-threshold for specific DSM-IV diagnosis)
  - Probable alcohol abuse or dependence (sub-threshold for specific DSM-IV diagnosis)
  - Somatoform disorder (sub-threshold for specific DSM-IV diagnosis)
  - Binge eating disorder (sub-threshold for specific DSM-IV diagnosis)

- Reasonable psychometric properties when compared with the PRIME-MD instrument that also are known to have good measures of reliability and validity. When compared with PRIME-MD, the PRIME-MD-PHQ had 85% overall accuracy; 75% sensitivity; and 90% specificity

- PRIME-MD items have been used in much of the GWV work (e.g., Goss Gilroy study, Iowa group study, and CCEP) so there will be some comparability to previous and ongoing findings

- Response burden would be kept to a minimum considering that it would cover three factors. There are three versions depending on the actual disorders to be covered. A short 2-page (Brief PHQ) covers mood and panic disorders. A 3-page version adds the other disorders described above. The 4-page version includes questions specifically for women with questions on pregnancy and childbirth, and a section for all respondents on recent psychosocial stressors. The 4-page version contains 17 main questions composed of a total of 79 sub-items. It is estimate that it requires 15-25 minutes to complete depending on the number of symptoms.

- Cost is minimal assuming permission is granted from Pfizer Inc. for use of scale in PHDACS context.

- The review team has contacted Dr. Spitzer, Columbia University and representatives from Pfizer Canada Inc. We are awaiting information regarding the protocol for obtaining information for use of PRIME-MD PHQ in the PHDACS context. Confirmation of permission to use is pending.

Mississippi Scale for Combat-Related Posttraumatic Stress Disorder (M-PTSD)

- Our rationale for using this scale to assess PTSD is the following:

- Reasonable psychometric properties

- One of the most commonly used instruments in research in the military

- Relatively low level of response burden with 35 to 39 items (depending on version) and takes approximately 15-20 minutes to complete.

- Cost would be minimal assuming permission to use the scale is granted.

The review team's initial communication with Dr. Keane, State University of Pennsylvania, indicates that he would be willing to have the M-PTSD scale used in the PHDACS context. We are awaiting receipt of scale materials and the protocol to be used to obtain formal permission for use of the scale.

Combat Exposure Scale (CES)

Our rationale for using this scale to assess exposure to specific combat experiences is the following:

- Reasonable psychometric properties

- One of the most commonly used instruments in research in the military; can be adapted to include items specific to certain deployments

- Relatively low level of response burden with 40-50 items (depending on the version) requiring approximately 15-20 minutes to complete.

- Cost would be minimal given that the scale is available to researchers at limited or no cost.

- The review team's has made initial contact with Dr. Keane, State University of Pennsylvania, to inquire whether he would be willing to have the CES scale used in the PHDACS context. We are awaiting receipt of scale materials and the protocol to be used to obtain formal permission for use of the scale.

Additional CCEP Items Measuring Psychological Exposures to Stress

Our rationale for adding additional items assessing exposure to stressors is to ensure that this aspect is well covered. At present, the most prevalent models in understanding MUPS in a military context have to do with exposure to stress and the prevalence of PTSD. A thorough understanding of psychological stress will be important in the understanding of MUPS. The unique CCEP stress items (those that do not overlap with the CES) combined with the CES would permit this thorough assessment with little additional cost and very little additional response burden, given that there is some duplication of items between the two measures. The review team is currently investigating the protocol required for obtaining permission for these additional items.

The combination of these three scales along with unique items from the CCEP would provide an adequate measurement of all factors identified in the literature review. In addition, the response burden and cost of implementing these measures into the PHDACS would be significantly less than if other measures were to be implemented.

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Fiedler, N., Lange, G., Tiersky, L., DeLuca, J., Policastro, T., Kelly-McNeil, K., McWilliams, R., Korn, L., & Natelson, B. (2000). Stressors, personality traits, and coping of Gulf War veterans with chronic fatigue. Journal of Psychosomatic Research, 48, 525-535.

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Proctor, S. P., Heeren, T., White, R. F., Wolfe, J., Borgos, M. S., Davis, J. D., Pepper, L., Clapp, R., Sutker, P. B., Vasterling, J. J., & Ozonoff, D. (1998). Health status of Persian Gulf War veterans: self-reported symptoms, environmental exposures and the effect of stress. International Journal of Epidemiology, 27, 1000-1010.

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Appendix A

Abstracts for Key Studies

Baker, D., Mendenhall, C. S. L. M. L., & Steinberg, J. (1997). Relationship between posttraumatic stress disorder and self-reported physical symptoms in Persian Gulf Veterans. Archives of Internal Medicine, 157, 2076-2078.

Abstract: BACKGROUND: While prior studies show that combat veterans with posttraumatic stress disorder (PTSD) report more physical symptoms than veterans without PTSD, the link between PTSD and somatic complaints in Persian Gulf War veterans (PGWVs) is yet to be evaluated. METHODS: A questionnaire booklet was completed by 188 PGWVs, of whom half were patients in a veterans' health screening clinic and half were non-treatment-seeking volunteers on active duty. The booklet included the Combat Exposure Scale, the Mississippi Post-Traumatic Stress Disorder Scale (MPTSD), and a subjective symptom-based health questionnaire. RESULTS: The 24 PGWVs (12.8%) with PTSD (MPTSD score > or = 116) reported more combat exposure (P = .02) and a greater number of physical symptoms (P = .001) than other PGWVs. Fatigue, nausea, muscle aches, dizziness, back pain, stomach ache, and numbness were much more likely to be reported by those with PTSD (MPTSD score > or = 116) than by those without PTSD (MPTSD score < or = 95). CONCLUSIONS: Physicians examining PGWVs should be alert to the possibility of PTSD in this group and that those with PTSD are more likely to report physical symptoms that may overlap with those in Persian Gulf syndrome. Consequently, mental health screening is essential, since for those veterans with PTSD diagnosis of other coexisting conditions may be confounded and early effective treatment of their PTSD may be delayed. Also, given the increased reporting of certain symptoms by those with PTSD, those seeking the cause of Persian Gulf syndrome should control for PTSD when determining the symptom cluster that may constitute this condition.

Binder, L. M. (1999). Subjective cognitive complaints, affective distress, and objective cognitive performance in Persian Gulf War veterans. Archives of Clinical Neuropsychology, 14, 531-536.

Abstract: Examined subjective cognitive complaints, affective distress, and cognitive performance in 100 Persian Gulf veterans (mean age 32.7 yrs) who reported illness and cognitive complaints. A stronger relationship was predicted between subjective cognitive complaints and affective distress than between subjective cognitive complaints and objective cognitive performance. Data from the Armed Forces Qualification Test, a self-administered mental aptitude test, were available for 54 Ss. Ss were also administered the SCL90-R, the Beck Depression Inventory and Beck Anxiety Inventory, and a series of neuropsychological assessments. The results suggest that cognitive impairment should not be diagnosed in this population without objective confirmation with cognitive testing. ((c) 1999 APA/PsycINFO, all rights reserved)

Coker, W., Bhatt, B., Blatchley, N., & Graham, J. (1999). Clinical findings for the first 1000 Gulf war veterans in the Ministry of Defence's medical assessment programme. BMJ, 318, 290-294.

Abstract: OBJECTIVE: To review the clinical findings in the first 1000 veterans
seen in the Ministry of Defence's Gulf war medical assessment programme to examine whether there was a particular illness related to service in the Gulf. DESIGN: Case series of 1000 veterans who presented to the programme between 11
October 1993 and 24 February 1997. SUBJECTS: Gulf war veterans. MAIN OUTCOME MEASURES: Diagnosis of veterans' conditions according to ICD-10 (international classification of diseases, 10th revision). Cases referred for psychiatric
assessment were reviewed for available diagnostic information from consultant
psychiatrists. RESULTS: 588 (59%) veterans had more than one diagnosed condition, 387 (39%) had at least one condition for which no firm somatic or psychological diagnosis could be given, and in 90 (9%) veterans no other main diagnosis was made. Conditions characterised by fatigue were found in 239 (24%)
of patients. At least 190 (19%) patients had a psychiatric condition, which in over half was due to post-traumatic stress disorder. Musculoskeletal disorders and respiratory conditions were also found to be relatively common (in 182 (18%)
and 155 (16%) patients respectively). CONCLUSION: Many Gulf war veterans had a wide variety of symptoms. This initial review shows no evidence of a single
illness, psychological or physical, to explain the pattern of symptoms seen in veterans in the assessment programme. As the veterans assessed by the programme
were all self selected, the prevalence of illness in Gulf war veterans cannot be

determined from this study. Furthermore, it is not known whether the veterans in this study were representative of sick veterans as a group.

Engel, C. C., Jr., Ursano, R., Magruder, C., Tartaglione, R., Jing, Z., Labbate, L. A., & Debakey, S. (1999). Psychological conditions diagnosed among veterans seeking Department of Defense Care for Gulf War-related health concerns. Journal of Occupational & Environmental Medicine, 41, 384-392.

Abstract: The Comprehensive Clinical Evaluation Program is a US military program that provides a voluntary, clinically oriented evaluation for Gulf War health concerns. This article presents administrative data on psychological conditions (as coded using the International Classification of Diseases, 9th Revision) from the first year of the program. The most commonly diagnosed psychological conditions were medically unexplained physical-symptom syndromes; depression and anxiety, including post-traumatic stress disorder; and alcohol abuse or dependence. Psychological conditions were significantly related to a higher number of workdays lost, and the 19% of veterans with a primary diagnosis of a psychological condition reported 28% of the lost workdays among veteran who participated. Stressful Gulf War experiences were weakly but significantly related to psychological conditions. We conclude that among Gulf War veterans seeking evaluation for Gulf War-related health concerns, psychological conditions are common and are associated with important occupational morbidity. (Abstract by: Author)

Fiedler, N., Lange, G., Tiersky, L., DeLuca, J., Policastro, T., Kelly-McNeil, K., McWilliams, R., Korn, L., & Natelson, B. (2000). Stressors, personality traits, and coping of Gulf War veterans with chronic fatigue. Journal of Psychosomatic Research, 48, 525-535.

Abstract: Preliminary surveys of Persian Gulf veterans revealed a significant prevalence of self-reported symptoms consistent with chronic fatigue syndrome (CFS). The purpose of this study was to compare self-reported life stressors combat, and chemical exposures, personality and coping between Gulf War veterans with CFS and healthy veterans. Following a complete physical, psychiatric, and neuropsychological evaluation, 45 healthy veterans, 35 veterans with CFS and co-morbid psychiatric disorder, and 23 veterans with CFS and no co-morbid psychiatric disorder completed questionnaires assessing war and non-war-related life stressors, self-reports of environmental exposure (e.g., oil well fires, pesticides), personality, and coping. Measures of personality, self-reported combat and chemical exposures, and negative coping strategies significantly differentiated healthy veterans from those with CFS. A biopsychosocial model of veterans' illness was supported by the fact that personality, negative coping strategies, life stress after the war, and environmental exposures during the war were significant predictors of veterans' current physical function. (PsycINFO Database Record (c) 2000 APA, all rights reserved)

Fukuda, K., Nisenbaum, R., Stewart, G., & Thompson, W. (1998). Chronic multisymptom illness affecting Air Force veterans of the Gulf War. Jama: Journal of the American Medical Association, 280, 981-988.

Abstract: Sought to develop a case definition for symptoms experienced by Gulf War veterans (GWVs) and to determine whether the prevalence of symptoms was increased among GWVs from 4 air force populations in comparison with nondeployed personnel. The study also attempted to characterize clinical features of and evaluate risk factors for Gulf War related symptoms. 3,723 currently active Ss (age 21-60 yrs), including 1,163 GWVs and 2,560 nondeployed personnel, completed a questionnaire survey assessing demographic and military characteristics and health status, including the presence and severity of 35 symptoms. 158 of the GWVs also completed a clinical evaluation including blood, urine, stool, and serological testing. A chronic multisymptom condition was found to be significantly associated with Gulf War deployment. A case was defined as having 1 or more chronic symptoms from at least 2 of 3 categories: fatigue, mood-cognition, and musculoskeletal. Among the 158 clinically-evaluated GWVs, 37% were noncases, 54% were mild-to-moderate cases, and 8% were severe cases. ((c) 1998 APA/PsycINFO, all rights reserved)

Gray, G. C., Kaiser, K. S., Hawksworth, A. W., Hall, F. W., & Barrett-Connor, E. (1999). Increased postwar symptoms and psychological morbidity among U.S. Navy Gulf War veterans. American Journal of Tropical Medicine & Hygiene, 60, 758-766.

Abstract: To investigate reports on war-related morbidity, 527 active-duty Gulf War veterans and 970 nondeployed veterans from 14 Seabee commands were studied in 1994 with a questionnaire, sera collection, handgrip strength, and pulmonary function testing. The questionnaire assessed postwar symptoms, war exposures, and screened for chronic fatigue syndrome, post-traumatic stress disorder, and psychological symptoms suggesting neurosis (Hopkins Symptom Checklist). Sera were tested with four nonspecific reactant assays: C-reactive protein, transferrin, ferritin, and haptoglobin. Gulf War veterans reported a higher prevalence for 35 of 41 symptoms, scored higher on psychological symptom scales, were more likely to screen for post-traumatic stress disorder, had lower handgrip strength, and had higher serum ferritin assay results. Numerous comparisons of these morbidity outcomes with 30 self-reported exposures demonstrated many associations, but no unique exposure or group of exposures were implicated. Morbidity data are consistent with other postwar observations, but the etiology for morbidity findings remains uncertain. (Abstract by: Author)

Haley, R. W. (1997). Is there a Gulf War syndrome? Searching for syndromes by factor analysis of symptoms. Jama: Journal of the American Medical Association, 277, 215-222.

Abstract: Attempted to define syndromes by a 2-stage factor analysis of symptoms in both ill and well, active and retired Gulf War veterans (GWVs) of the 24th Reserve Naval Mobile Construction Battalion. 249 GWVs completed survey booklets designed to measure symptoms and risk factors, and a psychological test in groups. 70% of the Ss reported having had serious health problems that most attributed to the war, and 30% reported no serious health problems. Principal factor analysis yielded 6 syndrome factors in 25% of the Ss: (1) "impaired cognition," (2) "confusion-ataxia," (3) "arthro-myo-neuropathy," (4) "phobia-apraxia," (5) "fever-adenopathy," and (6) "weakness-incontinence". Ss with syndrome 2 were 12.5 times more likely to be unemployed than those with no health problems. A psychological profile found in 48.4% of those with the syndromes, differed from posttraumatic stress disorder (PTSD), depression, somatoform disorder, and malingering.
((c) 1997 APA/PsycINFO, all rights reserved)

Iowa Persian Gulf Study Group. (1997). Self-reported illness and health status among Gulf War veterans: A population-based study. Jama: Journal of the American Medical Association, 277, 238-245.

Abstract: Assessed (1) the prevalence (PV) of self-reported symptoms and illnesses among Iowa military personnel deployed during the Persian Gulf War (PGW) and compared the PV of these conditions with that among Ss on active duty at the same time, but not deployed to the Persian Gulf (non-PGW); and (2) the relationship between self-reported medical and psychiatric conditions (MPCs) and the type of military service. 4,886 Ss were classified into 1 of 4 study domains: PGW regular military, PGW National Guard/Reserve, non-PGW regular military, and non-PGW National Guard/Reserve; overall, 3,695 Ss completed a cross-sectional telephone interview survey designed to assess MPCs. Results showed that Ss who participated in the PGW have a higher self-reported PV of MPCs than Ss who were not deployed to the Persian Gulf. Also, larger differences in PV between PGW and non-PGW Ss were observed in the National Guard/Reserve comparison. ((c) 1997 APA/PsycINFO, all rights reserved)

Kroenke, K., Koslowe, P., & Roy, M. (1998). Symptoms in 18,495 Persian Gulf War veterans. Latency of onset and lack of association with self-reported exposures. Journal of Occupational & Environmental Medicine, 40, 520-528.

Abstract: Toxic or environmental exposures have been suggested as a possible cause of symptoms reported by Gulf War veterans. To further explore this hypothesis, we analyzed findings in 18,495 military personnel evaluated in the Department of Defense Comprehensive Clinical Evaluation Program. The program was established in 1994 to evaluate Persian Gulf veterans eligible for Department of Defense medical care who had health concerns after service in the Persian Gulf during Operation Desert Shield/Desert Storm. The evaluation included a structured clinical assessment, a physician-administered symptom checklist, and a patient questionnaire addressing self-reported exposures, combat experiences, and work loss. Among 18,495 patients examined, the most common symptoms were joint pain, fatigue, headache, memory or concentration difficulties, sleep disturbances, and rash. Symptom onset was often delayed, with two-thirds of symptoms not developing until after individuals returned from the Gulf War and 40% of symptoms having a latency period exceeding one year. There was no association between individual symptoms and patient demographics, specific self-reported exposures, or types of combat experience. Increased symptom counts were associated with work loss, the number of self-reported exposures, the number of types of combat experience, and certain ICD-9 diagnostic categories, particularly psychological disorders. Prolonged latency of symptom onset and the lack of association with any self-reported exposures makes illness related to toxic exposure less likely. (Abstract by: Author)

Labbate, L. A. (1998). Psychiatric syndromes in Persian Gulf War veterans: An association of handling dead bodies with somatoform disorders. Psychotherapy & Psychosomatics, 67, 275-279.

Abstract: Traumatic combat experience has been associated with the development of posttraumatic stress disorder, but there have been few studies about the association of military combat experience and the development of somatoform disorders. The authors evaluated 131 referred Gulf War veterans for medical and psychiatric syndromes thought to be related to their involvement in the Gulf War. Patients completed questionnaires regarding their traumatic experiences and were interviewed using the Structured Clinical Interview for DSM III-R. For the sample, 69% had axis I conditions. Major depression, undifferentiated somatoform and posttraumatic stress disorders were the most common diagnoses. Reports of traumatic events were associated with both posttraumatic stress disorder and somatoform diagnoses. Veterans who handled dead bodies had a 3-fold risk of receiving a somatoform diagnosis. Psychiatric syndromes may explain some medical complaints following involvement in the Persian Gulf War. The results suggest that some psychological and nonspecific somatic symptoms persisting since the Gulf War may be related to exposure to psychological trauma. (PsycINFO Database Record (c) 2000 APA, all rights reserved)

Lange, G., Tiersky, L., DeLuca, J., Peckerman, A., Pollet, C., Policastro, T., Scharer, J., Ottenweller, J. E., Fiedler, N., & Natelson, B. H. (1999). Psychiatric diagnoses in Gulf War veterans with fatiguing illness. Psychiatry Research, 89, 39-48.

Abstract: The purpose of this study was to determine whether Gulf War Illness (GWI) can be explained by the presence of psychiatric disorders as assessed by DSM-III-R. To reduce the heterogeneity amongst Persian Gulf War veterans with GWI (PGV-F), only those were studied who presented with severe fatigue as a major complaint and also fulfilled clinical case definitions for Chronic Fatigue Syndrome, Idiopathic Chronic Fatigue, and/or Multiple Chemical Sensitivity. A total of 95 Registry PGVs were examined; 53 presented with GWI and 42 did not report any post-war health problems (PGV-H). All subjects were assessed for the presence of DSM-III-R Axis I psychiatric disorders. Compared to PGV-Hs, 49% of PGV-Fs had similar post-war psychiatric profiles: either no, or only one, psychiatric disorder was diagnosed. Psychiatric profiles of the remaining 51% of PGV-Fs were significantly different from PGV-Hs in that most of these veterans suffered from multiple post-war psychiatric diagnoses. The presence of psychiatric disorders as assessed by DSM-III-R criteria cannot explain symptoms of Gulf War Illness among all Persian Gulf veterans with severe fatiguing illness. (Abstract by: Author)

Nisenbaum, R, Barrett, Reyes & Reeves. (2000). Deployment stressors and a chronic multisymptom illness among Gulf War veterans. Journal of Nervous & Mental Disease, 188, 259-266.

Abstract: Unusual health problems have been reported by Gulf War (GW) veterans, but no single etiology has been linked to these illnesses. This study was conducted to determine the association between self-reported GW deployment stressors and an illness defined by a combination of fatigue, mood-cognition, and musculoskeletal symptoms. A total of 1,002 GW veterans from this cross-sectional survey of 4 Air Force units completed a self-administered questionnaire that asked about symptoms, demographic and military characteristics, and stressors during deployment. Severe and mild-moderate illness was positively associated with self-reports of pyridostigmine bromide use, insect repellent use and belief in a threat from biological or chemical weapons. Injuries requiring medical attention were only associated with severe illness. These results suggest a link between self-reported chemical, emotional, and physical exposures, and GW veterans' illness. Further research is needed to determine physiological and psychological mechanisms through which such stressors could have contributed to this symptom complex. ((c) 2000 APA/PsycINFO, all rights reserved)

Pierce, P. F. (1997). Physical and emotional health of Gulf War veteran women. Aviation Space & Environmental Medicine, 68, 317-321.

Abstract: Investigated the effects of deployment and military service during the Persian Gulf war on women's physical and emotional health. 525 women who were on active duty (mean age 30 yrs), in the reserves (mean age 34 yrs), or in the national guard (mean age 33 yrs) when the war started were sampled. Ss completed 2 series of self-report measures about general physical health, gender-specific health, the "Gulf War Syndrome," and emotional responses to war, including symptoms of post-traumatic stress disorder 2 and 4 yrs after the war. Ss deployed to the theater reported significantly more general as well as gender-specific health problems than did Ss deployed elsewhere. A cluster of common health problems included skin rash, cough, depression, unintentional weight loss, insomnia, and memory problems. The author concludes that follow-up study of a group of specific effects, including those concerning gynecologic and reproductive health, is needed. ((c) 1997 APA/PsycINFO, all rights reserved)

Proctor, S. P., Heeren, T., White, R. F., Wolfe, J., Borgos, M. S., Davis, J. D., Pepper, L., Clapp, R., Sutker, P. B., Vasterling, J. J., & Ozonoff, D. (1998). Health status of Persian Gulf War veterans: self-reported symptoms, environmental exposures and the effect of stress. International Journal of Epidemiology, 27, 1000-1010.

Abstract: BACKGROUND: Most US troops returned home from the Persian Gulf War (PGW) by Spring 1991 and many began reporting increased health symptoms and medical problems soon after. This investigation examines the relationships between several Gulf-service environmental exposures and health symptom reporting, and the role of traumatic psychological stress on the exposure-health symptom relationships. METHODS: Stratified, random samples of two cohorts of PGW veterans, from the New England area (n = 220) and from the New Orleans area (n = 71), were selected from larger cohorts being followed longitudinally since arrival home from the Gulf. A group of PGW-era veterans deployed to Germany (n = 50) served as a comparison group. The study protocol included questionnaires, a neuropsychological test battery, an environmental interview, and psychological diagnostic interviews. This report focuses on self-reported health symptoms and exposures of participants who completed a 52-item health symptom checklist and a checklist of environmental exposures. RESULTS: The prevalence of reported symptoms was greater in both Persian Gulf-deployed cohorts compared to the Germany cohort. Analyses of the body-system symptom scores (BSS), weighted to account for sampling design, and adjusted by age, sex, and education, indicated that Persian Gulf-deployed veterans were more likely to report neurological, pulmonary, gastrointestinal, cardiac, dermatological, musculoskeletal, psychological and neuropsychological system symptoms than Germany veterans. Using a priori hypotheses about the toxicant effects of exposure to specific toxicants, the relationships between self-reported exposures and body-system symptom groupings were examined through multiple regression analyses, controlling for war-zone exposure and post-traumatic stress disorder (PTSD). Self-reported exposures to pesticides, debris from Scuds, chemical and biological warfare (CBW) agents, and smoke from tent heaters each were significantly related to increased reporting of specific predicted BSS groupings. CONCLUSIONS:

Veterans deployed to the Persian Gulf have higher self-reported prevalence of health symptoms compared to PGW veterans who were deployed only as far as Germany. Several Gulf-service environmental exposures are associated with increased health symptom reporting involving predicted body-systems, after adjusting for war-zone stressor exposures and PTSD. (Abstract by: Author)

Roy, M. J. Koslowe, Kroenke & Magruder (1998). Signs, symptoms, and ill-defined conditions in Persian Gulf War veterans: Findings from the comprehensive clinical evaluation program. Psychosomatic Medicine, 60, 663-668.

Abstract: This study (1) analyzed the type and frequency of signs, symptoms, and ill-defined conditions (SSIDs) among 21,579 consecutive Persian Gulf War veterans with symptoms or health concerns after the war. Demographic data, self-reported exposures, symptoms, and physician-assigned International Classification of Diseases (ICD) primary and secondary diagnoses were recorded. A detailed psychosocial history, including a multidisciplinary discussion, was incorporated for a subset of participants. SSID conditions were primary diagnoses for 17.2% of veterans, and either primary or secondary diagnoses for 41.8%. Although some SSIDs were objective conditions (e.g., sleep apnea), most were simply symptoms. More comprehensive evaluation, especially the multidisciplinary discussion of findings, decreased the frequency of symptoms as diagnoses and increased the number of Mental Disorders-IV (DSM-IV) psychiatric diagnoses. Ill-defined conditions were not associated with particular self-reported exposures or demographic variables. Evidence for a new or unique illness related to wartime exposures did not emerge from this analysis. ((c) 1999 APA/PsycINFO, all rights reserved)

Sillanpaa, M. C. (1997). Gulf War veterans: A neuropsychological examination. Journal of Clinical & Experimental Neuropsychology, 19, 211-219.

Abstract: Examined the relatedness of neuropsychological and neurological functioning to subjective complaint, exposure, a clinical signs index, and possible interference variables. A subsample of 49 Persian Gulf War veterans (mean age 33.59 yrs) who represented an entire group of 82 veterans with respect to symptom severity participated in a neuropsychological assessment including a number of scales. Variables representing sustained attention, grip strength, motor coordination, vibratory sense, finger-tip number writing perception, executive functioning, memory functioning, and subjective complaint were evaluated. Findings show that neuropsychological performance appeared to be more related to emotional functioning than demographic variables or variables associated with the war. Ss differences may be contributing to different emotional reactions to illnesses , perceptions of exposure risks and cognitive functioning, and responses to stress. ((c) 1997 APA/PsycINFO, all rights reserved)

Storzbach, D. (2000). Psychological differences between veterans with and without Gulf War unexplained symptoms. Psychosomatic Medicine, 62, 726-735.

Abstract: Assessed measures of psychological and neurobehavioral functioning to determine their association with unexplained symptoms in Gulf War veterans. Persistent symptoms with no medical explanation associated with service in the Persian Gulf (e.g., fatigue, muscle pain, and memory deficits) that began during or after the war qualified respondents as cases. The 241 veterans (mean age 34.3 yrs) with unexplained symptoms were classified as case Ss, and the 113 veterans without symptoms were classified as control Ss. All veterans completed a battery of computerized assessment tests consisting of 12 psychosocial and 6 neurobehavioral tests. Case Ss differed substantially and consistently from control Ss on diverse psychological tests in the direction of increased distress and psychiatric symptoms. Case Ss had small but statistically significant deficits relative to control Ss on some neurobehavioral tests of memory, attention, and response speed. The results revealed that Gulf War veterans who report symptoms associated with that conflict differed on multiple psychological measures in the direction of increased distress and performed more poorly on neurobehavioral measures when compared with control Ss who did not report symptoms. (PsycINFO Database Record (c) 2000 APA, all rights reserved)

Unwin, C., Blatchley, N., Coker, W., Ferry, S., Hotopf, M., Hull, L., Ismail, K., Palmer, I., David, A., & Wessely, S. (1999). Health of UK servicemen who served in Persian Gulf War [see comments]. Lancet, 353, 169-178.

Abstract: BACKGROUND: Various symptoms in military personnel in the Persian Gulf War 1990-91 have caused international speculation and concern. We investigated UK servicemen. METHODS: We did a cross-sectional postal survey on a random sample of Gulf War veterans (Gulf War cohort, n=4248) and, stratified for age and rank, servicemen deployed to the Bosnia conflict (Bosnia cohort, n=4250) and those serving during the Gulf War but not deployed there (Era cohort, n=4246). We asked about deployment, exposures, symptoms, and illnesses. We analysed men only. Our outcome measures were physical health, functional capacity (SF-36), the general health questionnaire, the Centers for Disease Control and Prevention (CDC) multisymptom criteria for Gulf War illness, and post-traumatic stress reactions. FINDINGS: There were 8195 (65.1%) valid responses. The Gulf War cohort reported symptoms and disorders significantly more frequently than those in the Bosnia and Era cohorts, which were similar. Perception of physical health and ability were significantly worse in the Gulf War cohort than in the other cohorts, even after adjustment for confounders. Gulf War veterans were more likely than the Bosnia cohort to have substantial fatigue (odds ratio 2.2 [95% CI 1.9-2.6]), symptoms of post-traumatic stress (2.6 [1.9-3.4]), and psychological distress (1.6 [1.4-1.8]), and were nearly twice as likely to reach the CDC case definition (2.5 [2.2-2.8]). In the Gulf War, Bosnia, and Era cohorts, respectively, 61.9%, 36.8%, and 36.4% met the CDC criteria, which fell to 25.3%, 11.8%, and 12.2% for severe symptoms. Potentially harmful exposures were reported most frequently by the Gulf War cohort. All exposures showed associations with all of the outcome measures in the three cohorts. Exposures specific to the Gulf were associated with all outcomes. Vaccination against biological warfare and multiple routine vaccinations were associated with the CDC multisymptom syndrome in the Gulf War cohort. INTERPRETATION: Service in the Gulf War was associated with various health problems over and above those associated with deployment to an unfamiliar hostile environment.

Since associations of ill health with adverse events and exposures were found in all cohorts, however, they may not be unique and causally implicated in Gulf-War-related illness. A specific mechanism may link vaccination against biological warfare agents and later ill health, but the risks of illness must be considered against the protection of servicemen. (Abstract by: Author)

Wagner, A. W., Wolfe, J., Rotnitsky, A., Proctor, S. P., & Erickson, D. J. (2000). An investigation of the impact of posttraumatic stress disorder on physical health. Journal of Traumatic Stress, 13, 41-55.

Abstract: In a large sample of Gulf War veterans (N = 2301) we examined the relations between PTSD symptoms assessed immediately upon returning from the Gulf War and self-reported health problems assessed 18-24 months later. PTSD symptomatology was predictive of self-reported health problems over time for both men and women veterans, even after the effects of combat exposure were removed from the analysis. Female veterans reported significantly more health problems than male veterans, however, there was no interactive effect of gender and PTSD on health problems. These findings provide further support for the theory that psychological response to stressors impacts health outcome. (Abstract by: Author)

Wolfe, J. (1999). Relationship of psychiatric status to Gulf War Veterans' health problems. Psychosomatic Medicine, 61, 532-540.

Abstract: A growing body of research has shown that there are important links between certain psychiatric disorders and health symptom reporting. Two disorders in particular (posttraumatic stress disorder [PTSD] and major depression) have been the most widely implicated to date, and this association has sometimes been used to explain the occurrence of ill-defined medical problems and increased somatic symptoms in certain groups, most recently Gulf War veterans. Structured psychiatric diagnostic interviews were used to examine the presence of major psychiatric (axis I) disorders and their relation to health symptom reporting in a well-characterized, stratified subset of Gulf War veterans and a non-Gulf-deployed veteran comparison group. Rates of most psychiatric disorders were substantially lower than national comorbidity estimates, consistent with prior studies showing heightened physical and emotional well-being among active-duty military personnel. Rates of PTSD and major depression, however, were significantly elevated relative to the veteran comparison group. The diagnosis of PTSD showed a small but significant association with increased health symptom reports. However, nearly two-thirds of Gulf Ss reporting moderate to high health symptoms had no axis I psychiatric diagnosis. ((c) 1999 APA/PsycINFO, all rights reserved)

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Appendix B

Assessment of Measures

Beck Anxiety Inventory 1993 Edition	
Purpose	measures the severity of anxiety in adults and adolescents
Cost	- 1994 price data $46 per complete kit including 25 record forms and manual; $25.50 per 25 record forms; $22 50 per manual. - Scoring of each test is not free once the package has been purchased Credits must be purchased for the Use Counter (included) that is installed between the computer and the printer.
Length	(5-10) minutes 21 items, 4 point Likert Scale (0 "not at all" 3 Severely: I could barely stand it"
Format	-Self report - Group or individual administration - yields Total Score
Psychometric Properties	-internal consistency reliability excellent (85-.94) -test-retest 1 week .75 (Beck et al, 1988), Creamer, Foran, Bell (1995) .62 over 7 weeks -excellent validity (but poor discrim validity as BAI and BDI highly intercorrelated) -developed from sample of 810 outpatients of mixed diagnostic categories (predom mood and anxiety) -normative data tables for five anxiety diagnostic groups with the highest rep in sample (N=393)
Used in Military Context	- not mentioned beyond reviewed studies
Miscellaneous	-instructions focus on 2 week time frame ("Indicate how much you have been bothered by each symptom during the PAST WEEK, *INCLUDING* today"), BAI should measure state anxiety better than trait anxiety (Mental Measurements Yearbook 2001)

Beck Depression Inventory II	
Purpose	developed for the assessment of symptoms corresponding to criteria for diagnosing depressive disorders list in the DSM IV
Cost	1999 price data. $57 per complete kit including manual and 25 recording forms; $27 per manual; $29 50 per 25 recording forms, $112 per 100 recording forms, $29.50 per 25 Spanish recording forms, $112 per 100
Length	-5-10 minutes -21 items rated from 0 "not present" to 3 "severe" based on 2 week time frame (consistent with DSM IV) -yields Total Score
Format	-self report -group of individual administration
Psychometric Properties	-internal consistency 92 to .93 -test-retest over 1 week high (.93) -cut scores for the interpretation of BDI-II and placement of individual scores into range of depression severity have good sensitivity and moderate specificity (positive and negative predictive power not reported) -concurrent/convergent validity: corr with HRSD-R= 71, Beck Hopelessness Scale= 68, SCL-90-R Depression subscale=.89 -correlated with measures of anxiety (Revised Hamilton Anxiety Rating Scale=.47, BAI=.60, SCL-90-R Anxiety subscale=.71) -discriminant validity: outpatients had higher scores than college students, individuals with mood disorders had higher scores than individuals diagnosed with anxiety and adjustment disorders, corr with Revised Hamilton Anxiety Rating Scale mod= 47, higher corr with SCL-90-R depression subscale (89) than SCL-90-R anxiety subscale (71)
Used in Military Context	-not mentioned beyond the studies reviewed
Miscellaneous	-interpretation of test scores should only be undertaken by qualified professionals -BDI-II just as sound if not more so than its earlier versions (Mental Measurements Yearbook 2001)

CCEP Psychological stress exposure items	
Purpose	To assess exposure to specific deployment stressors
Cost	Previously used without cost in GGI study; would require further investigation as to whether there would be no cost for present use
Length	10 items; 5 minutes
Format	Yes/No; self-report paper and pencil test
Psychometric Properties	Unknown, there is now a significant amount of data collected through GGI data and US data to determine psychometric properties, may have some overlap with the Combat Exposure Scale
Used in Military Context	Developed specifically for GWV exposures
Miscellaneous	Would have good comparability with previous CF data and US's CCEP data

Combat Exposure Scale	
Purpose	To assess the combat exposure to violence, wounding, wounding or death of others, threat of sever injury or death, leadership failures, abusive violence, and POW captivity.
Cost	copyrighted but may have access for research purposes
Length	50 items; 15 to 20 minutes
Format	Paper and pencil self-report
Psychometric Properties	Two studies have been completed with military personnel which demonstrated that the scale had good reliability and validity when compared with clinician's judgements (Keane et al , 1989; Wolfe et al., 1993)
Used in Military Context	Developed for the military context
Miscellaneous	Modifications have been made to the items to ensure that specific exposures for particular deployments are incorporated

Hamilton Depression Inventory	
Purpose	designed for the evaluation of the severity of depressive symptomatology
Cost	1998 price data. $79 per complete kit (manual, 5 reusable item booklets, 25 summary sheets, 25 answer sheets, and 5 short form test booklets) ; $15 per 10 reusable item booklets, $29 per 25 short form test booklets; $27 per 25 answer sheets; $11 per 25 summary sheets, $38 per manual.
Length	-10 minutes -38 items tapping into 23 different symptoms (multiple parameters of intensity, frequency and duration-latency used) -yields Total Score -HDI, HDI-17 (parallels 17-item HRDS), HDI-SF (9 items) HDI-Mel (9 items measuring melancholia)
Format	-self-report -group or individual administration
Psychometric Properties	-internal consistency .89 (805 to .936 in comm sample, 724 to 905 in psych sample)—>some redundancy due to high internal consistency measures -test-retest reliability over 1-week .95 (comm and psych 918 to 958) -criterion-related validity good with clinical interview (high hit rate, sensitivity, specificity) -construct validity in question due to including of several symptoms ass. but not defining char of dep -concurrent validity: corr between HRDS and HDI 905 to 951, -convergent validity- corr with BDI, BHS, BAI, Adult Suicidal Ideation Questionnaire, Rosenberg Self-Esteem Scale (-), MCSD-SF (-) -discrim: neg. corr between HDI scales and social desirability -dep group scores higher than "other psych group" which scores higher than community sample" -demo and HDI scores on community adults, college undergrad, psych. outpatients before trt (age and sex diff, but not clinically sig) -norms from community sample
Used in Military Context	-not mentioned beyond use in current studies
Miscellaneous	-assesses more symptoms relevant to depression than BDI (Mental Measurements Yearbook 2001) -not designed to make DSM-IV dep. disord. diagn. (Mental Measurements Yearbook 2001) -designed for clinical (inpatients/outpatients) and nonclinical (college students and job applicants) -The HDI-SF was developed from items that best discriminated between depressed patients, patients with other psychiatric disorders, and a community sample that yields high item-total-scale correlations, three items not assessed were the "vegetative" symptoms: insomnia-hypersomnia, psychomotor agitation-retardation, and weight loss-appetite

Mississippi – Posttraumatic Stress Disorder Scale	
Purpose	Designed to diagnose PTSD among military personnel
Cost	-The Mississippi scale is copyrighted Information regarding the scale can be obtained from Terence. M. Keane Personal communication with Dr. Keane indicates that PHDACS could have access to scale for research purposes.
Length	-35 items, derived from the DSM-III symptoms used to diagnose PTSD (ratings made on 5-point Likert scale)
Format	-self report
Psychometric Properties	-internal consistency .94 -test-retest reliability over 1-week interval .97 -concurrent validity: correlation with Combat Expose Scale .25 -discriminant validity: PTSD group scores higher than psychiatric group who scores higher than well-adjusted group -sensitivity 93%, specificity 89%, hit rate 90% using cut-off score of 107 (Keane, Caddell, and Taylor, 1988) -concurrent validity corr between M-PTSD-DS with number of post-traumatic stress symptoms .82 in sample of U S. Marine Reservists, supports primary intent of scale to assess spectrum of DSM-III symptoms of PTSD (Sloan, Arsenault, Hilsenroth, and Harvill, 1995) (M-PTSD-DS slightly modified version of M-PTSD, items reworded to reflect Persian Gulf War content, 2 items changed to accommodate the experience of female veterans, 2 new items added to include questions about memory difficulties and hyperarousal symptoms)
Used in Military Context	-developed and standardized on male Vietnam-era veterans seeking therapy or other services from six Vietnam Veteran Outreach Centers and on other agency serving Vietnam veterans; also used in studies reviewed
Miscellaneous	

Personality Assessment Inventory	
Purpose	designed to provide information relevant to clinical diagnosis, treatment planning, and screening for psychopathology
Cost	1995 price data· $135 per comprehensive kit including professional manual, 2 reusable item booklets, 2 administration folios, 25 Form HS handscorable answer sheets, 25 adult profile forms, and 25 critical items forms, $30 per professional manual; $17 per reusable item booklet; $24 per 25 Form HS handscorable answer sheets; $15 per 25 profile forms, $17 per 25 critical items forms; $17 per administration folio.
Length	-40-50 minutes -344 items (rated on 4-point Likert Scale, "false, not at all true", "slightly true", "mainly true", "very true") -yields: **22 nonverlapping full scales. 4 validity scales** Inconsistency, Infrequency, Negative Impression, Positive Impression, **11 Clinical Scales· Somatic Complaints (Conversion, Somatization, Health Concerns, Total), Anxiety (Cognitive, Affective,Physiological, Total), Anxiety-Related Disorders** (Obsessive-Compulsive, Phobias, **Traumatic Stress, Total), Depression (Cognitive, Affective, Physiological, Total),** Mania (Activity Level, Grandiosity, Irritability, Total), Paranoia (Hypervigilance, Persecution, Resentment, Total), Schizophrenia (Psychotic Experiences, Social Detachment, Thought Disorder, Total), Borderline Features (Affective Instability, Identity Problems, Negative Relationships, Self-Harm, Total), Antisocial Features (Antisocial Behaviors, Egocentricity, Stimulus-Seeking, Total), Alcohol Problems, Drug Problems, **5 treatment scales** Aggression (Aggressive Attitude, Verbal Aggression, Physical Aggression, Total),: Suicidal Ideation, Stress, Nonsupport, Treatment Rejection, **2 interpersonal scales:** Dominance, Warmth, Total.
Format	-self-report -individual or group administration -Answers can be scored by hand (HS Answer Sheet), or optical scanning (SS Answer Sheet). Profile forms (Adults; College Students) allow quick conversion of raw scale scores into linear T-scores. -software system for administration, scoring, and interpretation may also be purchased from the publisher
Psychometric Properties	-internal consistency for 22 full scales 45 to .90 (median .81) for normative sample, .22 to 89 (median .82) for college sample, .23 to .94 (median .86) for clinical sample -internal consistency for the 31 subscales are .51 to .81 for census sample, 57 to .85 for college sample, .55 to 89 for clinical sample -test-retest reliability (retest interval 3-4 weeks) from .31 to .92 (median .82), subscale test-restest reliabilities 68 to .85 (median .78) -test-retest in community sample .29 to .94 for full scales, 67 to .90 for subscales over 24-day period, in college sample .32 to .90 for full scales, .54 to .86 for subscales over 28-day period -concurrent validity: correlations of PAI validity, clinical, treatment, and interpersonal scales with several other personality instruments (MMPI, STAI Beck Scales, Wahler Physical Symptoms Inventory, Fear Survey Schedule) reveal many small to moderate coefficients discriminant validity: significant differences between alcoholic and control groups, alcoholic and schizophrenic groups (Boyle & Lennon, 1994), the scales are non-overlapping -convergent and discriminant validity data provided for three broad classes of disorders (neurotic, psychotic, and behavior disorders) -adult normative standardization sample (stratified on gender, race, and age according to 1995 U.S. Census projections), adult clinical patients, college students -for most scales, differences among the demographic groups are generally small
Used in Military Context	-not mentioned beyond review of current studies
Miscellaneous	-requires 4th grade reading level -short form (160 items) but the 22 scales have insufficient items to achieve adequate reliability, use of short form not recommended (Mental Measurements Yearbook 2001)

	-full scale and subscale raw scores plotted onto the profile sheet and converted to linear T-scores which may then be compared to both the standardization sample and the clinical sample -interpretation proceeds by using single scale interpretation and then examining the configuration or pattern of elevations -there are 10 modal profiles, but assigning a particular profile to one of these groups is both complicated and laborious (Mental Measurements Yearbook 2001) -PAI may comprise too many scales with insufficient numbers of items for greatest practical utility, **it will serve a very useful role in both research and applied psychological applications** (Mental Measurements Yearbook 2001) -as further research and clinical information are collected on the PAI, **it should prove to be a worthy competitor to the MMPI-2** (Mental Measurements Yearbook 2001)

Posttraumatic Stress Diagnostic Scale	
Purpose	designed to aid in the diagnosis of posttraumatic stress disorder
Cost	1999 price data. $35 per hand scoring starter kit including manual, 10 answer sheets, 10 scoring worksheets, and 1 scoring sheet, $117 per hand scoring reorder kit including 50 answer sheets, 50 scoring worksheets, and 1 scoring sheet; $17 per 25 MICROTEST Q answer sheets; $4.25 per MICROTEST Q profile report; $26 per manual, $35 per MICROTEST Q preview package including manual, answer sheets, and materials for 3 assessments.
Length	-10-15 minutes -49-items -yields Symptom Severity Score, Number of Symptoms Endorsed, Symptom Severity Rating, Level of Impairment in Functioning, PTSD diagnosis
Format	-self-report paper and pencil or on-line self-report -can be hand scored, a computer-generated graphic Progress Report is available, utilizing NCS Assessments MICROTEST Q SYSTEM software, charting Symptom Severity and Number of Symptoms Endorsed, a professional quality computer-generated interpretive report with tables, the Profile Report, is also available using the same software -group administration
Psychometric Properties	-internal consistency for Symptom Severity Score .92 -test-retest over mean of 16.1 days .74, 87.3% diagnostic agreement between the administrations -face validity· designed to correspond to DSM-IV diagnostic criteria for PTSD -discriminant validity mean scores on Symptom Severity and Number of Symptoms endorsed for subjects meeting SCID criteria for PTSD higher than for those not meeting SCID criteria, 79.4% diagnostic agreement between PDS and SCID, sensitivity 82%, specificity 76 7% -convergent validity: corr with scales measuring constructs associated with PTSD—> BDI= 79, STAI (State)= 73, STAI (Trait)=.74, Impact of Event Scale (Intrusion Index)=.80, Impact of Event Scale (Avoidance Index)=.66 -normative sample VA hospitals, anxiety and PTSD treatment clinics, women's shelters, emergency-trauma centers, fire stations, ambulance corps, residential rehabilitation centers -scale is not a norm-referenced measure, it is criterion-referenced to determine the degree to which PDS responses accurately reflect the "correct" DSM-IV diagnostic decision
Used in Military Context	-not mentioned but **part of normative sample included individuals from Veterans Administration hospitals**
Miscellaneous	-should be used principally as research tool because evidence on its reliability and validity currently rests with a single unreplicated study (Mental Measurements Yearbook 2001)

Primary Care Evaluation of Mental Disorders – Patient Health Questionnaire	
Purpose	To assess based on DSM IV criteria: - mood disorders, - anxiety disorders, - alcohol disorders, - eating disorders, and - somatoform disorders
Cost	Often is provided free with approval from copyright holder (Pfizer Inc.)
Length	17 main questions with various sub-questions; 15 to 30 minutes to complete
Format	Paper and pencil
Psychometric Properties	Good validity with PRIME-MD as a diagnostic tool 85% overall accuracy; 75% sensitivity; and 90% specificity
Used in Military Context	Used in many of the military studies, including GGI, Iowa study, and CCEP
Miscellaneous	Given the wide use of this scale along with the number of relevant studies that have incorporated many of its items, adoption of this scale would permit comparability with other relevant data bases.

Symptom Checklist – 90 - Revised	
Purpose	designed primarily to reflect the psychological symptom patterns of psychiatric and medical patients as well as non-patients
Cost	1994 price data $75 per hand-scoring starter kit including manual, 50 answer sheets, 50 profile forms, 2 worksheets, answer keys, and bibliography (specify Nonpatient Adult, Nonpatient Adolescent, Outpatient Psychiatric, or Inpatient Psychiatric); $32.50 per 50 hand-scoring answer sheets; $17.50 per 50 profile forms and 2 worksheets (specify Nonpatient Adult, Nonpatient Adolescent, Outpatient Psychiatric, or Inpatient Psychiatric); $18 per answer keys; $19.50 per manual, price information for Interpretive Report and Profile Report scoring and software available from publisher.
Length	-15-20 minutes -90 items (rated on 5-point Likert scale in terms of how much discomfort each symptom has caused them within last week 0 "not at all" to 4 "extremely") -yields **Somatization**, Obsessive-Compulsive, Interpersonal Sensitivity, **Depression**, **Anxiety**, Hostility, Phobic Anxiety, Paranoid Ideation, Psychoticism, Global Severity Index (average rating of all 90 items), Positive Symptom Distress Index (average rating give to those symptoms which are complained), Positive Symptom Total (number of symptoms complained)
Format	-self report, companion clinician and observer rating forms also available -group administration
Psychometric Properties	-internal consistency from .77 (Psychoticism) to .90 (Depression) (psychiatric pop) -test-retest over 1 week from 78 (Hostility) to 90 (Phobic Anxiety) (psychiatric pop) -few validity studies, demonstrate levels of concurrent, convergent, discriminant and construct validity which are at a level comparable to other self-report inventories -discriminant validity: patients with different DSM III diagnoses were found to complain of different SCL-90-R symptoms -anxiety and depression scales cannot be distinguished and there is no evidence in undergrads that the nine SCL-90-R scales measures anything beyond a single factor of psychiatric disturbance or complaining (average intercorrelation among scales .58) -patients' and doctors' ratings were found not to agree except for their evaluation of the factors of Depression and Anxiety -symptom ratings have been found to differentiate between patients with "primary" and "secondary" depression -convergent validity: Depression factor significantly correlated with other measures of depression (e.g. BDI, HDRS), somatization, obsessive-compulsive, depression, phobic anxiety, paranoid ideation, GSI substantially and significantly corr with respective measure on Middlesex Hospital Questionnaire -8 sets of norms (4 male, 4 female) for psychiatric outpatients, psychiatric inpatients, adult non-patients, adolescent non-patients
Used in Military Context	-not mentioned beyond use in current studies reviewed
Miscellaneous	-requires 8th grade reading level -SCL-90-R cannot be recommended for clinical diagnostic purposes, can be very useful in research studies (Mental Measurements Yearbook 2001)

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(U) The present project reviews the literature regarding psychological and social-psychological factors that have been previously identified in the medical and psychological literature as related and/or implicated with medically unexplainable physical symptoms (MUPS). Based on this review, suitable measurement tools are identified to assist in the development of a longitudinal database to be developed by the Directorate of Medical Policy Prospective Health Data Analysis Capability Study (PHDACS). Th initial step involved identification of the main psychological and social-psychological factors that have been associated with MUPS among military personnel. The second step required the identification of various instruments that potentially could be used for the PHDACS. The findings were that the most frequently reported key factors that appear to be associated with reporting of physical symptoms in the military context are posttraumatic stress disorder and exposure to psychological stressors, depression, anxiety, and somatization. Instrument selection was based on the following assumptions: the focus shou be on self-report measures; the measures proposed have solid psychometric/diagnostic properties; the measures be relevant/sensitive to the military context; and, there should be considerations made with regards to response burden and cost. The measures recommended were the Primary Care Evaluation of Mental Disorders – Patient Health Questionnaire (Spitzer, Kroenke, & Williams, 1999) to assess depression, anxiety and somatization; Mississippi Scale for Combat Related Posttraumatic Stress Disorder (Disorder (Keane, Cadell, & Taylor, 1988) to assess PTSD, the Combat Exposure Scale (Kean Fairbank, Caddell & Zimering, 1989) and the United States military's Comprehensive Clinical Evaluation Program items designed to specifically assess psychological exposures to stress.

15. KEYWORDS, DESCRIPTORS or IDENTIFIERS

(U) military personnel; Medically Unexplained Physical Symptoms; literature review; measurement tools; psychological variables; psychological stressors; depression; anxiety; somatization

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